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UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 23

CENSUS OF DYES AND COAL-TAR CHEMICALS

1920

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

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UNITED STATES TARIFF COMMISSION.

Office: Eighth and E Streets NW., Washington, D. C.

COMMISSIONERS.

THOMAS WALKER PAGE, *Chairman.*
THOMAS O. MARVIN, *Vice Chairman.*
DAVID J. LEWIS.
WILLIAM S. CULBERTSON.
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LETTER OF TRANSMITTAL.

UNITED STATES TARIFF COMMISSION,
Washington, June 28, 1921.

TO THE PRESIDENT:

The Tariff Commission transmits herewith a report showing the results of the census of production of dyes and related coal-tar chemicals for the year 1920. This census has been taken in conformity with the letter of the President dated October 27, 1917, requesting the Tariff Commission to secure the information on the relation between the domestic production and the imports of dyes and other coal-tar chemicals, required by section 501 of the act of September 8, 1916.

Very respectfully,

THOMAS WALKER PAGE, *Chairman.*
THOMAS O. MARVIN, *Vice Chairman.*
DAVID J. LEWIS.
WILLIAM S. CULBERTSON.
EDWARD P. COSTIGAN.

THE PRESIDENT,
The White House, Washington.

INTRODUCTION.

This report is a survey of the domestic dye and coal-tar chemical industry in 1920. It presents the results of a special investigation made by the United States Tariff Commission as to the production of dyes and other coal-tar chemicals in the United States and of the imports of dyes. The report is divided into four parts, as follows:

PART I, *a summary of developments in dyes and coal-tar chemicals 1920*, describes the progress made in the various branches of the American industry. The relation of the export and import trade to the industry is briefly shown.

PART II, *the production of dyes and coal-tar chemicals in 1920*, gives a detailed discussion of the significant facts in the production of crude, intermediate, and finished coal-tar products during 1920. Dyes are classified by their methods of application, and imports in 1914 (fiscal year) and 1920 (calendar year) are compared with production from 1917 to 1920, inclusive. The number of employees, rates of pay, and cost of research in the coal-tar chemical industry are shown.

PART III, *dyes imported for consumption in the United States, 1920, calendar year*, shows the quantity and value of imports of individual dyes, and the percentage of quantity of each dye by countries of origin.

PART IV, *an appendix*, gives the imports and exports of coal-tar dyes and chemicals and of natural dyes since 1917. A list of manufacturers whose production during 1920 was reported to the Tariff Commission is also shown

In the preparation of this report the Tariff Commission had the services of Warren N. Watson, A. R. Willis, and C. R. De Long, of the chemical division and of others of the commission's staff.

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PART I

SUMMARY OF DEVELOPMENTS IN DYES AND COAL-TAR CHEMICALS, 1920

PART I.

SUMMARY OF DEVELOPMENTS IN DYES AND COAL-TAR CHEMICALS, 1920.

INTRODUCTORY.

The United States Tariff Commission has reported annually, beginning with 1917, the progress of the American dye industry. These reports in each instance have been based upon a census of production of dyes and other coal-tar chemicals taken in accordance with a request of the President for information necessary to administer section 501 of the act of September 8, 1916. In the 1919 report and in the present 1920 report production figures on dyes are supplemented by a detailed analysis of imports. Other reports prepared by the Tariff Commission relating to conditions in the dye industry include (1) Costs of Production in the Dye Industry, 1918 and 1919; and (2) Dyes and Other Coal-Tar Chemicals, December 12, 1918.

The general grouping of coal-tar chemicals adopted in the present 1920 report follows that of the act of September 8, 1916, which conforms in general (although not in every detail) with common practice. Group I, crudes, exempt from duty, are contained in and separated from crude coal tar; Group II, intermediates, dutiable at 15 per cent and 2½ cents per pound, are produced from the crudes by chemical processes and, with some exceptions, are used only for the manufacture of dyes or other finished products by further chemical treatment, and Group III, dyes and other finished products now dutiable in part at 30 per cent and in part at 30 per cent and 5 cents per pound. The term "other finished products" includes color lakes, photographic chemicals, medicinals, flavors, perfume materials, synthetic resins, and synthetic tanning materials. A summary of the production of coal-tar products in 1920 according to the classes given above is shown in Table 1.

The 1920 report is based on the production of 213 firms engaged in the manufacture of coal-tar products, which, it is believed, represents a complete record of the production of dyes and coal-tar chemicals in the United States. The quantity and value of the domestic production of each product and the analysis of these figures are given in as great detail as possible without revealing the operations of individual manufacturers. Dyes imported for consumption during the calendar year 1920 are also reported as to quantity, invoice value, and countries of origin. The report also presents a detailed analysis of the export trade in dyes, by months, from July, 1917, to April, 1921, inclusive.

Important Developments in the Domestic Industry.

CRUDES.

The output of coal tar by American coke ovens is sufficient to meet the demands of the domestic coal-tar chemical industry for crude materials. During 1920 the output of by-product ovens increased 23 per cent. Of the total quantity of coke produced, 60 per cent was by-product and 40 per cent beehive. So far as crude materials are concerned, there is no obstacle to the development of a complete line of dyes and other coal-tar chemicals in this country.

In the production of the essential crudes—benzene, toluene, naphthalene, and anthracene—there was a large gain in quantity in 1920. Anthracene, used as a raw material in the manufacture of vat and alizarin dyes, showed a particularly encouraging increase, but the quantity produced was inadequate to supply the domestic demand based on the prewar consumption. A year ago the question of how to obtain an adequate supply of anthracene was one of the most vital problems facing the dye industry in this country. During 1920 the commercial production of synthetic anthraquinone in increased amounts gives promise of solving this very important problem. The indications now are that as fast as the needs of the dye makers increase for these two fundamental products the domestic output will meet these demands. The production of crudes is shown in detail in Part II of this report.

INTERMEDIATES.

The total production of intermediates in 1920 was 257,726,911 pounds, valued at $95,291,686, an increase of 45 per cent in quantity over that of 1919. The average value per pound of all intermediates showed practically no change from that of the previous year. The 1919 production, however, was below the total quantity made in 1918 when the intermediates reached 357,662,251 pounds. The abnormally low output in 1919 is explained by the falling off of the demands for munitions and poison gases following the signing of the armistice as well as by the smaller requirements for dyes to supply military needs.

During 1920 intermediates were consumed almost exclusively in the manufacture of coal-tar dyes, photographic chemicals, medicinals, flavors, perfume materials, synthetic phenolic resins, and synthetic tanning materials. Not only did certain intermediates—such as aniline oil, benzidine, H acid, betanaphthol—used in producing those dyes which represent the bulk of output, show large increases, but there was also a general increased output of those intermediates previously used in relatively small quantities in the production of fast colors and special types. This general tendency gave a better balance in the production of intermediates for our normal requirements. Of the 236 intermediates reported, 70 were produced for the first time in 1920. There are still certain intermediates not reported, or reported only in small amounts, which must be added to the American industry to give a complete line of colors.

An important development in the production in 1920 of products classed as "intermediates," although used as finished products, is

represented by the production for the first time of triphenyl phosphate in substantial quantities and the output of tricresyl phosphate in lesser quantities. These two coal-tar products have been developed as substitutes for camphor in the manufacture of pyroxylin plastics. Although it is doubtful whether these products can completely replace camphor in the manufacture of pyroxylin plastics, they offer a means of overcoming to some degree the monopoly which Japan has held in the past in the production of camphor.

DYES.

Domestic output.—In 1920, 82 manufacturers reported a total production of 88,263,776 pounds of dyes, valued at $95,613,749. Of the 360 or more dyes reported 240 were identified by Schultz tables. The quantity produced in 1920 represents an increase of about 40 per cent over that of 1919 and exceeds the imports of 1914 by 92 per cent. In general the dyes used in large quantities were made in amounts sufficient to supply the American needs. A number of these colors were made in considerable excess of our domestic needs and formed a large part of our export trade in dyes during 1920. The tendency of the year's development was toward a better balance in both variety and quantity of those dyes required for domestic use. The American dye manufacturer is now approaching the stage where he is beginning to manufacture dyes of secondary importance, so far as quantity consumed is concerned.

The output during 1920 of the dyes, by classes according to their method of application, was as follows: Acid, 17,741,538 pounds, an increase of 45 per cent over 1919; basic, 4,993,001 pounds, an increase of 24 per cent; direct, 19,882,631 pounds, an increase of 37 per cent; lake and spirit soluble, 2,205,281 pounds, an increase of 21 per cent; mordant and chrome, 3,900,209 pounds, a slight decrease; sulphur, 20,034,500 pounds, a 14 per cent increase; vats (including indigo), 19,338,099 pounds; indigo, 18,178,231, an increase of over 100 per cent; other vats, 1,159,868, an increase of nearly 200 per cent; and unclassified, 168,517 pounds.

One of the outstanding features of 1920 was the production of 18,178,231 pounds of indigo, valued at $13,497,981. This quantity exceeds by 105 per cent the production of 1919 and is 116 per cent greater than the importation of 1914. Sulphur black, which has previously been the first color in quantity produced, ranked second in 1920 with an output of 16,305,037 pounds. These two colors were exported in large quantity in that year.

Definite progress was made in the production of "vat dyes other than indigo"; the output of this class increased from 389,158 pounds in 1919 to 1,159,868 pounds in 1920. The vat dyes in common with alizarin derivatives of the "mordant and chrome class" were among the last to be developed (indigo excepted) because of their complex character, the high cost of production, difficulty of anthracene supplies, German control of patents, and the small quantity for which there is a market. The total quantity of "vat dyes including indigo" produced in 1920 was 87 per cent greater than the imports of this class during 1914. The excess of the 1920 production over the prewar consumption is due to the increased production of a comparatively few colors, especially indigo. Although there has been an adequate output of

certain vat dyes which have been produced, the class has not been made in a sufficient variety of colors. The progress of 1920 has demonstrated the ability of the American industry to produce vat dyes on a large scale, but this class of dyes is as yet incompletely developed.

Number of manufacturers of each dye.—A study of the dyes produced during 1920 from the standpoint of the number of manufacturers producing each dye shows that of the 360 dyes produced, 108 were each manufactured by three or more firms; the output of these represented 92 per cent of the total quantity produced in 1920. Of the total number of dyes produced, 200 were each manufactured by one firm only, but these dyes represented only 5 per cent of the total output. A fact of still greater significance was that over one-half of the total output consisted of those dyes (35 in number) each of which was made by seven or more separate firms.

Imports of dyes.—In 1920 (calendar year) the total imports of coal-tar dyes were 3,402,582 pounds valued at $5,763,437, a decrease of about 99,000 pounds from the imports of the fiscal year 1920. Fifty-one per cent of these dyes came from Germany, 34 per cent from Switzerland, 6 per cent from England, and 9 per cent from all other countries. "Vat dyes other than indigo" made up the largest class imported and totaled 761,363 pounds. Part III, of the report contains a detailed analysis of dyes imported during the calendar year 1920.

Exports of dyes.—The exports of dyes are grouped by the Commerce Department reports under (1) aniline dyes, (2) logwood extract, and (3) all other dyes and dyestuffs, and only the value of these groups is given. The total exports of "aniline dyes" in 1920 was $22,450,480, which was more than 100 per cent increase over that of 1919. The combined exports of "aniline dyes" and "all other dyes and dyestuffs" were valued at $29,823,591 in 1920, which is nearly double the value of 1919 shipments. In the first four months of 1921 the exports of "aniline dyes" showed a rapid decline, receding from a value of $943,595 in January to $305,760 in April. This represents a large decrease from the average monthly export of $1,870,873 in 1920 and was undoubtedly chiefly due to the appearance of German dyes, either directly or through reexport of reparation dyes, in the large export markets of the world, such as China, India and Japan.

The Tariff Commission in its report on dyes for 1919 in discussing this subject said that—

> In estimating the significance of this achievement of the domestic industry in the exportation of dyes it should be remembered that domestic manufacturers during 1919 and 1920 have met little competition in foreign markets from German dyes. It should also be pointed out that any deductions as to the competitive strength of the domestic industry which are based on exports of dyes do not take into consideration the fact that the domestic industry is still deficient in the important group of vat and alizarin dyes.

The significance of this statement is borne out by the rapid decrease in the exports of dyes during the first four months of 1921 as outlined above.

Production and consumption.—The tariff act of September 8, 1916, provides that unless by September 8, 1921, the domestic industry

PART II

PRODUCTION OF DYES AND COAL-TAR CHEMICALS IN 1920

PART II

PRODUCTION OF DYES AND COAL-TAR CHEMICALS IN 1920

PART II.

CTION OF DYES AND COAL-TAR CHEMICALS IN 1920.

Crudes.

ised by-product coke-oven capacity.—The total output of uct coke in 1920, as reported by the United States Geological was 30,908,000 net tons, an increase of 23 per cent over that when 25,142,542 tons were produced. Of the total 1920 coke ion, 60 per cent was made from by-product ovens and 40 per n beehive ovens. During 1920 over 700 new by-product coke ere placed in operation, thus making a total of over 10,000 uct ovens, which have supplemented the wasteful beehive this country. This increase in productive capacity of by- coke gives the American dye industry further assurance of uate supply of coal tar for the distillation of crudes. While ene has been in the past the only crude not available in ade- mounts, the developments of 1920 in synthetic anthraquinone increased output of crude anthracene indicate that as the nents of the domestic dye manufacturer increase, this demand net from the combined production of anthracene and synthetic uinone.

t of coal-tar crudes.—The crudes produced by distillation at uct coke ovens are reported to the United States Geological The output from this source for 1919 and the preliminary or 1920 are shown in Table 2. The production of crudes by gaged primarily in the operation of coal-tar distilleries was l to the United States Tariff Commission and is shown in . The figures from both sources must be considered in arriv- he total output for a given year. The two tables referred to, r, do not include the production of crudes at coal-gas, water- l oil-gas plants. Data for the production in these plants is mpiled by the United States Geological Survey, but is not yet e for publication. The output from this source, however, ites only a small percentage of the total crudes produced.

g 1920 there was a large increase in output of benzene, toluene, lene, and anthracene. The production of crude naphthalene l by coal-tar distillers was 26,393,411 pounds in 1920, com- ith 12,612,203 pounds in the previous year, while crude naph- reported from coke-oven operations in 1920 amounted to 00 pounds (preliminary figures), as compared with 3,549,998 in 1919. A serious shortage of naphthalene occurred during l in the earlier part of 1920, which resulted in the importation amounts during those periods. The insufficient supply was he fact that following the signing of the armistice producers ately decreased their output, as they believed the large accu-

mulation of stocks on hand at that time constituted an oversupply. When export restrictions were removed, however, there was an unexpected increase in the export trade in dyes, which resulted in a very large consumption of naphthalene for dye manufacture. Naphthalene stocks were soon exhausted and there ensued in the latter part of 1919 and in the early part of 1920 an acute shortage of this product. The 1920 program for the production of naphthalene was adjusted as rapidly as possible to meet the domestic needs, although the total output during 1920 was not sufficient for our entire requirements.

The most important actual development in the output of crudes was the increase in anthracene oil, which totaled in 1920, 3,284,102 pounds. This yielded 2,829,500 pounds (25 per cent purity) of crude anthracene. Both of these figures represent a large gain over the previous year. (The 1919 figures, however, were not publishable.) The domestic supply of anthracene is not sufficient to meet the total requirements for the production of all of the vat and alizarin dyes consumed in this country. This problem is further considered under Intermediates, page 24, where it is pointed out that developments during 1920 in the production of synthetic anthraquinone, together with the increased supply of crude anthracene from coal tar, promise to solve this very important problem. The output of carbazol, which is obtained as a by-product in refining anthracene, showed an increase over the previous year. Dyes prepared from this crude product were first reported in 1920.

TABLE 2.—*By-products obtained from coke-oven operations in 1919 and 1920.*

[From Mineral Resources, United States Geological Survey.

Product.	Unit of quantity.	1919		1920 [1]	
		Quantity.	Value.	Quantity.	Value.
Tar:					
Produced	Gallons	288,898,764		360,000,000	
Sold	do	217,980,143	$6,919,265	172,000,000	$7,400,000
Ammonia:					
Sulphate—					
Produced	Pounds	544,231,985		675,000,000	
Sold	do	557,619,631	21,075,718	629,000,000	27,130,000
Ammonia liquor and anhydrous ammonia [2]—					
Produced	Pounds NH_3	50,535,639		65,000,000	
Sold	do	51,646,744	5,692,950	61,000,000	8,300,000
Total ammonia expressed as sulphate—					
Produced	Pounds			935,000,000	
Sold	do			881,000,000	35,480,000
Gas: Sold	M cu. ft	[3] 193,072,979	16,685,007	[4] 227,000,000	32,050,000
Benzol products:					
Crude light—					
Produced	Gallons	92,356,750		109,000,000	
Sold				843,000	96,000
Benzol, crude—					
Produced	Gallons	44,060,970		8,960,000	
Sold	do	44,607,615	7,776,669	1,730,000	430,000
Refined—					
Produced	do	17,006,532		16,890,000	
Sold	do	18,403,909	3,783,552	15,580,000	4,030,000

[1] The figures for 1920 are preliminary and subject to revision. They have been furnished by the courtesy of the United States Geological Survey.

[2] Includes anhydrous ammonia reported as such—an ammonia liquor converted to equivalent in anhydrous ammonia.

[3] The gas sold during 1919 was distributed according to use as follows: 5,238,486 cubic feet, $2,106,806 value of sales for illuminating and household purposes; 138,170,761 cubic feet, $8,015,877 value of sales for industrial purposes; 49,655,732 cubic feet, $6,562,324 value of sales for public service corporations.

[4] The gas sold during 1920 was distributed according to use as follows: 24,000,000 cubic feet, value at plant, $2,150,000, used under boilers or other coke-plant equipment; 150,000,000 cubic feet, value at plant, $14,200,000, used in steel or other affiliated plant; 53,000,000 cubic feet, value at plant, $15,700,000 distributed through city mains.

TABLE 2.—*By-products obtained from coke-oven operations in 1919 and 1920*—Contd.

Product.	Unit of quantity.	1919.		1920.	
		Quantity.	Value.	Quantity.	Value.
Benzol products—Continued.					
Motor fuel—					
Produced	Gallons	(a)		[b] 55,100,000	
Sold	do			53,200,000	$12,070,000
Toluol—					
Crude, produced	do			287,000	
Refined—					
Produced	do	1,160,136		2,740,000	
Sold	do	1,353,827	$355,990	2,490,000	760,000
Solvent naphtha—					
Produced	do	3,915,489		5,420,000	
Sold	do	3,625,978	552,853	4,530,000	820,000
Other refined oils—					
Produced	do	575,885			
Sold	do	127,483	18,358		
Naphthalene:					
Crude—					
Produced	Pounds	3,549,998		10,710,000	
Sold	do	4,038,456	82,244	10,750,000	290,000
Refined—					
Produced	do	2,763,271		3,450,000	
Sold	do	2,663,585	109,120	3,700,000	200,000
Other products sold			645,142		30,000
Total value of sales			63,696,868		93,626,000

[a] Included in crude benzol.
[b] The percentage of benzol reported in the motor fuel ranged from 50 to 90.

TABLE 3.—*Production of coal-tar crudes during 1920, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

The numbers in the second column refer to the numbered alphabetical list of manufacturers given on p.116. An X indicates that the corresponding product was made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there was actual production of the corresponding article but that the figures can not be published without revealing the output of individual firms.

Name.	Manufacturers' identification No. (See page 116.)	1920		
		Quantity.	Value.	Value per unit.
Total crudes [1]			$21,163,937	
Benzene.....gallons	16, 26, 40, 51, 85, 116, 147, X	875,561	287,586	$0.33
Toluene.....do	16, 51			
Xylene.....do	16, 51			
Naphthalene, crude.....pounds	16, 26, 29, 40, 46, 85, 91, 98, 116, 135, 141, X, X.	26,393,411	791,403	.03
Anthracene, 25 per cent pure.pounds	16, 91, 135, 141	2,829,500	114,661	.04
Carbazol, crude, 60 per cent.....do	135			
Cresol.....gallons	16, 135			
Pyridine.....do	16, 111			
Solvent naphtha.....gallons	16, 40, 51, 141, 147, X	472,000	74,669	.16
Dead or creosote oil.....do	16, 26, 29, 40, 46, 51, 83, 85, 91, 98, 116, 135, 141, 147, 166, X, X, X, X, X, X, X, X.	37,557,245	4,395,290	.12
Anthracene oil.....gallons	40, 91, 135, 141, X	3,284,102	593,839	.18
Pitch of tar.....tons	16, 26, 29, 40, 46, 51, 83, 85, 98, 116, 135, 141, X, X, X, X, X, X, X, X.	342,401	5,245,554	15.32
Other distillates.....gallons	16, 26, 40, 46, 83, 98, 135, 141, X, X, X, X.	8,052,242	1,577,727	.20
Refined tars.....barrels	16, 24, 26, 46, 51, 83, 98, 116, 141, X, X, X, X, X, X, X.	1,386,056	7,582,553	5.47

[1] The instructions sent to manufacturers were as follows:
Include under "dead or creosote oil" only products which may be used for creosoting.
Include under "other distillates" shingle stain oils, disinfectant oils, and flotation oils which do not contain over 5 per cent phenol. Include under "refined tars" those tars which are used for road treatment, saturating felt, and for protective coatings.
Phenol and all distillates which, on being subjected to distillation, yield in the portion distilling below 210° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate, are not to be included here but are to be placed in Group II.
Cresol, for the purpose of this report, is defined as a distillate, containing more than 5 per cent of phenol and at least 50 per cent *of the isomeric cresols.*

TABLE 4.—*Comparison of production of coal-tar crudes, 1919 and 1920, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

Name.	1919			1920		
	Quantity.	Value.	Value per unit.	Quantity.	Value.	Value per unit.
Total crudes		$17,657,750			$21,163,937	
Benzene.....gallons..	1,826,373	500,547	$0.31	875,561	287,586	$0.33
Naphthalene.....pounds..	12,612,203	327,201	.03	26,393,411	791,403	.03
Solvent naphtha.....gallons..	266,013	78,817	.30	472,000	74,669	.16
Dead or creosote oil.....do....	43,431,059	4,264,594	.10	37,557,245	4,395,290	.12
Pitch of tar.....tons..	283,086	3,619,339	12.79	342,401	5,245,554	15.32
Other distillates.....gallons..	6,867,001	1,401,500	.21	8,052,242	1,577,727	.20
Refined tars.....barrels..	1,384,047	6,549,778	4.73	1,386,056	7,582,553	5.47

INTERMEDIATES.

INTRODUCTORY.

The production of intermediates in the United States during 1920 is shown in Table 5 in as great detail as possible without revealing the output of individual manufacturers. The total output during 1920 was 257,726,911 pounds valued at $95,291,686, an increase of 45 per cent over the quantity produced in 1919—177,362,426 pounds valued at $63,210,079. The 1920 production shows not only a considerable increase in the fundamental intermediates used in the manufacture of those dyes which represent the bulk of production, but more conspicuously an increase in those which were made either in small quantities or were not made at all in 1919, and which are essential for the production of the fast dyes. The number of intermediates reported by 119 firms in 1920 was 236, compared with 216 intermediates by 116 firms in 1919. The difference in the total number of intermediates for 1919 and 1920 does not represent the total of new intermediates made in 1920, as no production was reported in the latter year for some intermediates produced in 1919. The increased variety and output of intermediates in 1920 represents encouraging progress toward supplying the domestic needs for the manufacture of dyes as represented by the prewar consumption in this country.

For the development of a completely balanced and self-sustaining dye industry in this country, an increased output of certain intermediates already manufactured in small quantities, together with the production of other intermediates required in relatively small amounts, will be necessary. A color may frequently be used in small amounts only and yet be essential in the production of a given line of fabrics. Certain specialties in this class are not yet developed in the United States.

The output of intermediates used for research and experimental purposes was 1,852 pounds valued at $39,721, compared with 2,291 pounds valued at $23,333 in 1919.

INCREASED OUTPUT OF FUNDAMENTAL INTERMEDIATES.

The output of those intermediates required in the production of the bulk of dyes consumed in this country showed significant increases. The following percentages of increase in 1920 compared with 1919 are examples of the year's development in this class of intermediates: Aniline oil, increased 61 per cent; b-naphthol, 147 per cent; dimethylaniline, 53 per cent; Gamma acid, 170 per cent; H

acid, 35 per cent; a-naphthylamine, 233 per cent (used also in ore flotation); p-nitroaniline, 63 per cent, and benzidine base, increased by 91 per cent.

Benzene derivatives.—Aniline oil, required in the manufacture of dyes of every class, was produced in larger quantity than any other individual intermediate. The figures for 1919 were 24,345,786 pounds valued at $5,932,536, compared with 39,234,186 pounds valued at $10,923,648 in 1920. The output of dimethylaniline, a derivative of aniline, used in the production of a variety of acid and basic dyes, increased from 3,559,654 pounds valued at $1,941,152 in 1919 to 5,447,107 pounds valued at $3,857,631 in 1920.

The manufacture of diethylaniline, another derivative of aniline, used in the preparation of the more expensive colors, such as Brilliant Green and Acid Violet 4 BN, increased from 30,000 pounds valued at $26,500 in 1919 to 180,542 pounds valued at $245,783 in 1920.

Benzidine base, one of the most important intermediates used in the production of direct cotton dyes, increased in output from 1,084,922 pounds in 1919 to 2,071,858 pounds in 1920. The production of aminoazobenzene, used largely in making Brilliant Croceine and Induline, increased from 54,297 pounds in 1919 to 152,310 pounds in 1920. The decrease in production of phenol U. S. P. (the grade meeting the specifications of the United States Pharmacopœia) was undoubtedly due to large war stocks carried over. Salicylic acid U. S. P. showed only a relatively small increase in 1920; the technical grade, however, increased from 3,467,055 pounds in 1919 to 3,914,163 pounds in 1920.

In the production of resorcinol U. S. P. and technical, there was an increase from 96,397 pounds in 1919 to 139,315 pounds in 1920. The three-fold increase in the output of diethyl-m-aminophenol required in the manufacture of the dye, Rhodamine B, serves to illustrate the increased use of those intermediates which are made in smaller quantities, yet whose production is of great importance for some of the special colors in constant demand.

Triphenylphosphate, used as a substitute for camphor in pyroxylin plastics, first appeared in 1920 and was reported in large quantity; tricresyl phosphate, similarly used, was made in smaller quantities. Although it is not likely that these coal-tar products can entirely replace natural camphor for this purpose, they offer a possibility of lessening to some degree the dependence of pyroxylin manufactures upon the Japanese camphor monopoly.

Toluene derivatives.—Among the more important representatives of this class of intermediates are the toluidines. The manufacture of o-toluidine showed an increase of 30 per cent or from 1,002,982 pounds in 1919 to 1,302,097 pounds in 1920, while p-toluidine increased from 575,841 pounds in 1919 to 894,169 pounds in 1920 or by 55 per cent. For tolidine used in the manufacture of direct cotton dyes (mostly reds and blues) there was reported an increase of 160 per cent or from 143,012 pounds in 1919 to 375,905 pounds in 1920. The output of benzoic acid was only a small increase over 1919, but there was an increase in benzoate of soda from 610,150 pounds in 1919 to 812,193 pounds in 1920.

Production of the intermediate 2-chloro-5-toluidine-4 sulfonic acid, used in the preparation of the important color-lake dye Lake Red C, was reported for the first time in 1920. Certain intermediates derived from tol*uene which are required in* the preparation of perfume

materials showed notable increases in 1920. The manufacture of cinnamic acid, for example, increased more than four-fold or from 2,502 pounds in 1919 to 11,517 pounds in 1920 and that of benzyl alcohol increased from 15,678 pounds in 1919 to 38,807 pounds in 1920, or 147 per cent.

Xylene derivatives.—The output of xylidine and xylidine salt (used in the manufacture of wool scarlets and reds and Resorcin Brown) increased two and one-half times or from 415,736 pounds, valued at $239,646 in 1919, to 1,054,476 pounds, valued at $490,941 in 1920. The quantity of dehydrothio-m-xylidine made in 1920 was more than a four-fold increase over the 1919 output. This intermediate is used in the production of Erica BN and 2GN, and Salmon Red, both valuable direct cotton dyes.

Naphthalene derivatives.—The more important naphthalene intermediates in general showed conspicuous increases in output during 1920, and there was also a considerable increase in the production of many of those used in relatively small quantities. The output of H acid (1-amino-8-naphthol-3:6-disulfonic acid), one of the most important intermediates derived from naphthalene, amounted to 5,180,993 pounds, valued at $6,377,081 in 1920, as compared with 3,837,534 pounds in 1919, valued at $5,081,469. Phthalic anhydride, used in the preparation of fluorescein, the eosines, rhodamines, and synthetic anthraquinone, increased in production from 290,677 pounds in 1919 to 796,210 pounds in 1920. Among the other intermediates for which there were reported a large increase in production were: Gamma acid (2-amino-8-naphthol-6-sulfonic), which is used largely in the production of direct blacks and other direct cotton dyes, 155,025 pounds in 1919 to 418,456 pounds in 1920, or by 170 per cent; G acid (2-naphthol-6:8-disulfonic) used in the manufacture of Brilliant Croceine, Erica G, and Diamine Scarlet B, from 732,198 pounds in 1919 to 1,446,605 pounds in 1920; and 2-naphthylamine-1-sulfonic acid, used in the manufacture of Diazo Black, from 84,260 pounds in 1919 to 325,036 pounds in 1920, or nearly a four-fold increase. Neville and Winther's acid (1-naphthol-4-sulfonic) and Schaeffer's acid (2-naphthol-6-sulfonic), also showed large increases in output—63 and 225 per cent, respectively.

Among those intermediates used in lesser quantities, Chicago acid (1 amino-8-naphthol-2:4-disulfonic), used in the preparation of Chicago Blue 4B and RW, and Brilliant Benzo Blue 6B, showed a substantially increased production. J acid (2-amino-5-naphthol-7-sulfonic acid), used in the preparation of benzo fast scarlets and Oxydiamine Violet BF, was reported for the first time in 1920. Figures for the production of these products, however, can not be published without disclosing individual operations.

Anthracene derivatives.—In 1920 the output of refined anthracene (calculated on a 100 per cent basis) by five firms was 711,258 pounds, valued at $285,789. The production of anthraquinone, the important intermediate derived from anthracene, increased from 294,260 pounds, valued at $547,787 in 1919, to 539,619 pounds, by six firms in 1920, valued at $894,418. This increase is due in part to the commercial development of synthetic anthraquinone from phthalic anhydride and benzene. The production of anthraquinone in 1920 was still inadequate to meet the domestic needs for vat and alizarin dyes as measured by prewar imports. It is believed that an adequate output of vat and alizarin dyes in 1920

t hindered by lack of anthracene or anthraquinone, but by the at manufacturers have not yet had the necessary time to over- all manufacturing difficulties incidental to this important of dyes. As domestic requirements for a soft pitch limit the of anthracene from coal tar, it is likely that our future supply hraquinone will in large part be derived by this synthetic l. The encouraging developments in 1920 in output of anthra- e give assurance that supplies of this intermediate will be le when needed for an increased output of vat and alizarin s manufacturers become more proficient in this group of dyes. output in 1920 of β-aminoanthraquinone used in the produc- vat colors was more than nine times greater than that of 1919. anthraquinone intermediates showed significant increases. The production figures could not be published on account of reveal- nfidential figures of manufacturers. It is in the anthraquinone hat the greatest deficit of intermediates has existed in the tic program, and the developments of 1920 in this field are of l importance in giving a well balanced output of dyes for tic consumption.

TABLE 5.—*Production of coal-tar intermediates during 1920.*

[bers in the second column refer to the numbered alphabetical list of manufacturers printed on . An X signifies that the corresponding intermediates were made by a manufacturer who did not to the publication of his name in connection therewith. Blanks in the third and fourth columns that there was actual production of the corresponding intermediates in the United States during t that the figures can not be published without revealing information in regard to the output of al firms. The details thus concealed are, however, included in the totals. Reports have been from all firms known to be manufacturers.]

Common name.	Manufacturers' identification numbers according to list on page 116.	Total production, 1920.		Average price per pound.
		Quantity.	Value.	
		Pounds.		
al intermediates		257, 726, 911	$95, 291, 686	$0.37
de, tech	4, 22, 33, 59, 79, 110, 112, 117, 141.	2, 667, 252	1, 126, 751	.42
acid	7, 112			
phenylenediamine (p-amino ide).	33, 64, 112, 117, 141	97, 275	158, 606	1.63
toluidine	141			
toluidine	33, 141			
n base	112			
anthraquinone	51, 117			
o-benzene	25, 33, 52, 64, 69, 92, 141	152, 310	148, 332	.97
o-toluene	33, 69, 114			
nzoic acid	33, 108			
benzoic acid	140			
esol methyl ether	112			
dimethylaniline	89, 112, X	314, 931	723, 818	2.30
2-naphthol-4-sulfonic acid	7, 22, 25, 33, 51, 52, 59, 64, 92, 112, 114, 117, X.	971, 370	797, 745	.82
- 8 - naphthol - 2: 4 - disul- id.	51, 117			
8-naphthol-4-sulfonic acid	117			
- 8 - naphthol - 3: 6 - disul- id.	22, 33, 51, 64, 107, 109, 112, 114, 117, 122, 134, X.	5, 180, 993	6, 377, 081	1.23
8-naphthol-7-sulfonic acid	141			
8-naphthol-6-sulfonic acid	7, 22, 25, 51, 92, 112, 117	418, 456	1, 298, 700	3.10
phenol	10			
phenol and hydrochloride	10, 23, 28, 51, 54, 64, 92, 117, 162, 167.	41, 474	74, 987	1.81
phenol p-sulfonic acid	112			
phenyl arsonate (sodium)	103			
phenyl arsonic acid (crude)	103			
phenyl arsonic acid (pure)	103			
licylic acid	112			
alicylic acid	51			
il	23, 25, 30, 33, 51, 64, 84, 106, 110, 112, 113, 117, 131, X.	39, 234, 186	10, 923, 648	.28
alt (and sulphate)	23, 25, 69, 112, 113	2, 024, 956	741, 620	.37
or red	112			
ne	51, 117			
ne, refined (anthracene con- 0 per cent).	12, 16, 112, 135, X	711, 258	285, 789	.40

TABLE 5.—*Production of coal-tar intermediates during 1920*—Continued.

Common name.	Manufacturers' identification numbers according to list on page 116.	Total production, 1920.		Ave pric per
		Quantity.	Value.	
		Pounds.		
Anthracene blue base	112			
Anthranilic (o-aminobenzoic) acid	57, 110, 158			
Anthraquinone (98 per cent)	12, 16, 51, 87, 112, 117	539,619	2894,41a	
Anthraquinone mono sulfonic acid	112			
Anthraquinone-2-sodium sulfonate (silver salt).	17, 51, 117			
Anthraquinone - 1:5 - disulfonic (sodium).	112			
Anthraquinone - 2:7 - disulfonic (sodium).	112			
Benzanthrone	117			
Benzalchloride	32, 34, 57			
Benzaldehyde	19, 30, 32, 34, 57, 65, 139, 161	702,543	440,407	
Benzene sulfonic acid	X			
Benzidine base	7, 22, 30, 33, 51, 84, 112, 117, X	2,071,858	2,375,210	
Benzidine sulfate	3, 7, 33, 109, 117, X	111,725	95,555	
Benzidine hydrochloride	117			
Benzoate of soda	19, 34, 57, 71, 77, 101, 140, X	812,193	643,66	
Benzoic acid, U. S. P. and tech	19, 32, 34, 57, 139, 140, 161, X	743,113	501,531	
Benzoyl benzoic acid	117			
Benzoyl chloride	19, 57, 65, 77, 161, X	14,277	16,937	
Benzotrichloride	19			
Benzyl alcohol	32, 57, 65, 89, 149, 161, X, X	38,807	70,839	
Benzyl alcohol and acetate	34			
Benzylchloride	19, 30, 32, 57, 139	1,246,412	279,285	
Broenner's acid, see 2-naphthylamine-6-sulfonic acid.				
Bromobenzene	50			
Carbazol, refined	16, 51			
p-Chloroaniline	33			
p-Chloroaniline sulfonic acid	141			
1-Chloro-8-napthol-3:6-disulfonic acid	112			
o-Chlorobenzaldehyde	112			
Chlorobenzene (mono)	50, 51, 77, 92, 119, 137	4,829,142	498,209	
Chloronaphthalene	36			
o-Chlorotoluene	112			
2-Chloro-5-toluidine-4-sulfonic acid	33, 96, X	22,753	48,716	
Chromotropic acid, see 1:8-Dihydroxy-naphthalene-3:6-sulfonic acid.				
Cinnamic acid	32, 34, 57, 161, X	11,517	48,977	
Creosote oil, containing more than 5 per cent tar acids.	X, X			
Cresol, purity of 90 per cent or more	101			
o-Cresotinic acid	71			
Cresylic acid	51			
Cumidine	89, 112, X	28,405	47,328	
Dehydrothio-p-toluidine sulfonic acid	55, 59, X	51,961	84,067	
Dehydrothio-m-xylidine base and sulphate.	33			
p-p-Diaminodiphenylmethane	72			
Diaminophenol and hydrochloride	167			
Diaminostilbene disulfonic acid	33, 51, 59, 112, 117	142,227	295,118	
Dianisidine	51, 117			
1-Diazo-2-napthol-4 sulfonic acid	22, 59, 92, 114	265,204	252,282	
Dibenzanthrone	117			
o-Dichlorobenzene	50			
p-Dichlorobenzene	50, 77, 92, 137	465,292	40,925	
Diethylamine	108			
Diethylaniline	30, 51, 74, 112, 153	180,542	245,783	
Diethyl m-aminophenol	37, 51			
1:5-Dihydroxy anthraquinone	112			
1:5-Dihydroxynaphthalene	112			
1:8-Dihydroxynaphthalene-3:6-disulfonic acid.	7, 33, 112, 117	152,352	380,305	
Dimethylaniline	8, 23, 30, 51, 102, 112, X	5,447,107	3,857,631	
1:5 Dinitroanthraquinone	17, 112			
Dinitrobenzene	14, 23, 51, 112, 117, X	2,492,178	674,141	
m-Dinitrobenzene	51, 64, 84, 109, 162	887,934	254,099	
Dinitrochlorobenzene	14, 50, 51, 64, 92, 169	5,947,791	1,409,332	
Dinitrodibenzanthrone	117			
Diphenylmethane sulfonic acid	112			
Dinitrophenol, and sodium salt	14			
Dinitrotoluene	14, 51, 52, 60, 64, 69, 112, 117, 155, X, X.	1,847,191	419,383	
Diphenylamine	51			
Diphenylmethane	112			
Ethyl acetanilide (mono)	112			
Ethyl p-aminobenzoate	108			
Ethylaniline (mono)	30, 51			
Ethylbenzylaniline	51, 59, 89, 112	150,636	143,595	
*Ethyl*benzylaniline sulfonic acid	30			

ABLE 5.—*Production of coal-tar intermediates during 1920*—Continued.

Common name.	Manufacturers' identification numbers according to list on page 116.	Total production 1920.		Average price per pound.
		Quantity.	Value.	
		Pounds.		
ylaniline disulfonic acid	30, 117			
phthylamine	X			
ne	117			
	69, 112			
e	141			
cid, see 1-naphthylamine ionic acid.				
	112			
id, see 2-amino-8-naphthol c acid.				
naphthoic acid	33			
phenol arsonic acid	47			
phenyl arsonate (sodium)	103			
quinoline	21			
e 1-amino-8-naphthol-3:6- c acid.				
e blue R S powder	117			
	45, 112			
ol	92			
	89			
acid, see 1-naphthylamine acid.				
cid	33, 51, 52, 64, 112, X	499,304	$594,980	$1.19
tiphenyldiamine	X			
Diethyl aniline mixture	112			
ne, solidifying 79° C. or fined, flake).	16, 29, 91, 98, 135, 139, 166, X, X	30,230,734	2,308,536	.08
ne 2:7 disulfonic acid	33			
	78, 112, X			
, tech	23, 25, 33, 69, 129, 141	11,920,714	5,592,007	.47
, U. S. P	23, X			
-4-sulfonic acid	3, 7, 25, 33, 51, 92, 112, 117	561,929	789,657	1.41
-5-sulfonic acid	59, 112			
-1-sulfonic acid	33			
-6-sulfonic acid	7, 33, 52, 64, 92, 112, 141	475,243	348,034	.73
-7-sulfonic acid	33, 141			
-8-sulfonic acid	33, X			
-3:6-disulfonic acid	117			
-3:8-disulfonic acid	3			
-3:6-disulfonic acid	3, 22, 23, 25, 33, 51, 59, 64, 67, 92, 112, 117, 141, 142, 163, X	1,250,674	820,389	.66
-5:7-disulfonic acid	112			
-6:8-disulfonic acid	3, 7, 22, 23, 25, 51, 92, 112, 141	1,446,605	990,326	.68
-3:6:8-trisulfonic acid	33, 112			
amine	16, 33, 51, 117	5,177,547	1,756,001	.34
lamine	112, 129			
amine-4-sulfonic acid	3, 25, 33, 43, 51, 67, 69, 92, 112, 117, X, X	3,773,191	1,581,485	.42
amine-5-sulfonic acid	25, 51, 59, 64, 112	294,352	246,495	.84
amine-6-sulfonic acid	112, 117			
amine-8-sulfonic acid	51, 59, 64, 112	562,939	542,862	.96
amine-1-sulfonic acid	7, 33, 129, 141, X	325,030	584,867	1.80
amine-6-sulfonic acid	33, 117			
amine-5:7-disulfonic acid	112			
amine-3:8-disulfonic acid	117			
amine-4:8-disulfonic acid	117			
amine 4:6 and 4:7 disul-	33			
amine 6:7-disulfonic acid	51			
amine-4:8-disulfonic acid	117			
amine-6:8-disulfonic acid	22, 25, 51, 92, 112, 117	894,624	992,160	1.11
amine-3:6:8-trisulfonic acid	22, 33, 51, 64, 112, 117, 122	3,921,950	1,935,444	.51
1 Winther's acid, see 1- -4-sulfonic acid.				
ne	51, 162			
ine	22, 33, 51, 117, 141, X	2,138,492	2,503,886	1.17
anilide	33, 92, 117, 141	509,728	385,283	.68
ole	33, 51, 112, 117	273,327	262,389	.96
ne (oil of myrbane)	23, 25, 33, 64, 112, 113, 117, 131, X	53,244,008	7,652,805	.14
zaldehyd)	112			
ic acid	108			
zoic acid	140			
robenzene	33, 51, 110, 112	349,389	116,226	.33
robenzene	33, 51, 110, 112, 141	959,405	300,066	.32
benzene sulfonic acid	22			
benzene-o-sulfonic acid	141			
	112			
iazo-2-naphthol-4-sulfonic	22, 92			
ydroxy phenyl arsonic acid	104, 108			
thalene	16, 117			

TABLE 5.—*Production of coal-tar intermediates during 1920*—Continued

Common name.	Manufacturers' identification numbers according to list on page 116.	Total production, 1920.	
		Quantity.	Value.
		Pounds.	
o-Nitrophenol	10, 162		
p-Nitrophenol	10, 14, 54, 110, 162, X	125, 693	$90, 579
p-Nitrophenol arsonic acid	47		
Nitrosodimethylaniline	7, 8, 10, 23, 33, 89, 92, 112, X, X, X	155, 966	155, 319
Nitrosophenol	45, 51, 64, 92, 112	167, 855	97, 668
p-Nitrosophenol	117		
Nitrosulfo anthrarufin	112		
Nitrotoluene	33, 52, 60, 69, 112, 117	6, 100, 618	787, 063
o-Nitrotoluene	33, 60, 112, 117	2, 173, 279	283, 319
m-Nitrotoluene	51, 117, 155		
p-Nitrotoluene	14, 33, 51, 60, 112, 117, X	2, 004, 089	1, 220, 797
p-Nitrotoluene sulfonate	117		
p-Nitrotoluene-o-sulfonic acid	33, 112		
m-Nitrotoluidine	155		
p-Nitro-o-toluidine	33		
m-Nitro-p-toluidine	33, 51, 141	71, 197	230, 952
Nitroxylene	23, 25, 33, 112, 117	1, 649, 934	234, 696
Oxylylamino phenylarsinic acid	108		
Phenazine	92		
Phenol, U. S. P	16, 101		
Phenol disulfonic acid	22		
Phenyl-alpha-naphthylamine	22, 51		
m-Phenylenediamine	7, 8, 10, 14, 23, 33, 51, 55, 64, 69, 84, 109, 112, 117, 162.	658, 313	696, 065
p-Phenylenediamine	112, 141		
Phenylglycine, sodium salt	112		
Phenylhydrazine and hydrochloride	72, 89		
Phenylhydrazine-p-sulfonic acid	23, 33, 112, 152	441, 117	550, 514
1-Phenyl naphthylamine-8-sulfonic acid.	112		
Phthalamide	33, 158		
Phthalic acid and anhydride	51, 110, X	796, 210	362, 431
Picramic acid	23, 51, 112, X, X	138, 350	83, 035
Picryl chloride	89		
Primuline, base	33, 112, 127, 169	140, 741	201, 193
Primuline sulfonic acid	33		
Quinaldine, crude	112		
Resorcinol, U. S. P. and tech	112, 136, X	139, 315	516, 419
Rosaniline	49		
Salicylic acid, U. S. P	19, 44, 50, 51, 71, 86, 106, 110, 125	2, 663, 494	956, 786
Salicylic acid, tech	44, 51, 71, 86, 106, 110, 125, 139	3, 914, 163	1, 133, 152
Schaeffer's acid, see 2-naphthol-6-sulfonic acid.			
Sulfanilic acid	8, 23, 25, 33, 51, 64, 69, 84, 101, 112, 118, X, X.	1, 796, 838	649, 524
Tetramethyldiaminobenzhydrol (Michler's hydrol).	51, 64, 112, 117	88, 583	198, 894
Tetramethyldiaminobenzophenone (Michler's ketone).	22, 51, 114	90, 664	262, 826
Tetramethyldiaminodiphenylmethane	51, 117		
Tetramethyltetraminodiphenylmethane.	X		
Thiocarbanilide	112, 113, X, X, X	2, 226, 807	903, 213
Thiocarbanilide derivatives	X		
Tolidine	33, 51, 112, 117, X	375, 905	418, 806
Tolidine hydrochloride	117		
o-Toluene sulfamide	X		
p-Toluene sulfamide	110, X		
o-Toluene sulfochloride	X		
p-Toluene sulfochloride	71, X		
Toluidine	30, 33, 51, 60, 112, 117	1, 145, 361	419, 068
m-Toluidine	117		
o-Toluidine	14, 33, 51, 60, 112, 117, 155, X	1, 302, 097	371, 057
p-Toluidine	14, 33, 51, 60, 112, 117, 155, X	894, 169	1, 010, 701
p-Toluidine-o-sulfonic acid	33		
o-Toluidine sulfonic acid	69		
m-Tolylenediamine	10, 30, 51, 52, 64, 69, 84, 92, 112, 117.	689, 036	828, 299
p-Tolylenediamine	112		
m-Tolylenediamine sulfonic acid	112		
1-Tolylnaphthylamine-8-sulfonic acid	112		
Tricresylphosphate	125		
Triphenylphosphate	125		
Triphenylguanidine	112		
Victoria green leuco base	112		
m-Xylidine and acetate	33		
Xylidine and salt	7, 23, 25, 33, 51, 112, 117, 155	1, 054, 476	490, 941

E 6.—*Comparison of the production of coal-tar intermediates, 1919 and 1920.*

[For detailed production in 1920 see Table 5, supra.]

Name.	Production, 1919.			Production, 1920.		
	Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
	Pounds.			*Pounds.*		
al intermediates	177,362,426	$63,210,079	$0.36	257,726,911	$95,291,686	$0.37
de, tech	1,934,125	797,151	.41	2,667,252	1,126,751	.42
phenylenediamine (p-amino-de)	62,567	103,750	1.66	97,275	158,606	1.63
benzene	54,297	48,464	.89	152,310	148,332	.97
naphthol-4-sulfonic acid	837,384	808,894	.97	971,370	797,745	.82
naphthol-3:6-disulfonic acid	3,837,534	5,081,409	1.32	5,180,993	6,377,081	1.23
naphthol-6-sulfonic acid	155,025	667,360	4.30	418,456	1,298,700	3.10
nol and hydrochloride	128,627	282,970	2.20	41,474	74,987	1.79
	24,315,786	5,932,536	.24	39,234,186	10,923,648	.28
and sulphate)	1,446,909	359,296	.24	2,024,956	741,620	.37
ne (98 per cent)	294,260	547,787	1.86	539,619	894,418	1.66
	518,634	403,109	.77	702,513	440,407	.63
e	1,084,922	1,370,393	1.26	2,071,558	2,375,210	1.15
fate	234,707	224,383	.96	111,725	95,555	.86
ds	610,150	536,194	.88	812,193	643,166	.79
U. S. P. and tech	720,310	581,386	.81	743,113	501,531	.68
ide	7,889	15,988	2.03	14,277	16,937	1.19
l	15,678	33,770	2.15	38,807	70,829	1.82
e	720,953	166,182	.23	1,246,412	279,285	.22
(mono)	4,116,666	623,875	.15	4,829,142	498,209	.10
ne disulfonic acid	2,502	10,305	4.12	11,517	48,977	4.25
t hol-1-sulfonic acid	5,021	19,082	3.80	142,227	295,118	2.08
zene	419,319	417,815	.99	265,204	252,282	.95
	130,864	8,746	.07	465,292	40,925	.09
naphthalene-3:6-disulfonic	30,000	26,500	.88	180,542	245,783	1.36
	164,654	380,344	2.31	152,352	380,305	2.50
ne	3,559,654	1,941,152	.55	5,447,107	3,857,631	.71
zene	2,228,597	534,498	.24	887,934	254,099	.29
benzene	4,428,730	907,794	.20	5,947,791	1,409,332	.24
e	746,295	264,388	.35	1,847,191	419,383	.23
	453,137	266,172	.59	499,304	594,960	1.19
solidifying 79° C. or above						
te)	17,625,235	1,160,815	.07	30,230,734	2,308,536	.08
ech	4,835,778	2,365,801	.49	11,920,714	5,592,007	.47
ulfonic acid	344,449	629,857	1.83	561,929	789,657	1.41
ulfonic acid	146,111	102,975	.71	475,243	348,034	.73
-disulfonic acid	1,008,007	721,341	.72	1,250,674	820,389	.66
-disulfonic acid	732,198	602,949	.82	1,446,605	990,326	.68
ine	1,552,828	632,587	.41	5,177,547	1,756,001	.34
ine-4-sulfonic acid	2,008,189	1,235,742	.62	3,773,191	1,581,485	.42
ine-1-sulfonic acid	84,260	174,420	2.70	325,036	584,867	1.80
ine-3:6:8-trisulfonic acid	1,418,560	867,005	.61	3,921,950	1,985,444	.51
	1,309,820	1,383,797	1.05	2,138,492	2,503,886	1.17
ide	699,658	484,666	.69	569,728	385,283	.68
oil of myrbane)	42,544,017	5,899,837	.14	53,244,008	7,652,805	.14
nzene	1,012,384	374,867	.37	959,405	306,666	.32
	76,191	76,464	1.00	125,693	90,579	.72
rianiline	592,509	363,913	.61	155,986	155,319	.99
	139,794	70,724	.51	167,855	97,668	.58
	6,211,775	1,049,522	.17	6,100,618	787,063	.13
	1,360,599	312,416	.23	2,173,279	283,319	.13
	1,263,056	704,750	.56	2,004,089	1,220,797	.61
dine	58,454	210,307	3.59	71,197	230,932	3.24
	293,219	53,449	.18	1,649,934	234,696	.14
amine	609,789	617,379	1.01	658,313	696,065	1.06
acid anhydride of	290,677	290,037	.99	796,210	362,431	.46
	150,458	130,388	.86	138,350	83,035	.60
S. P. and tech	96,397	402,491	4.20	139,315	516,419	3.71
U. S. P.	2,619,726	918,832	.35	2,663,494	956,786	.36
tech	3,467,055	1,009,462	.29	3,914,163	1,133,152	.29
diaminobenzophenone	1,023,861	243,656	.24	1,706,338	649,524	.38
etone)	281,057	488,553	1.74	90,664	262,826	2.90
de	2,268,375	802,575	.35	2,226,807	903,213	.41
	143,012	254,861	1.85	375,905	418,806	1.11
	806,210	309,894	.38	1,145,361	419,068	.37
	1,002,982	503,020	.50	1,302,097	371,057	.29
	575,841	600,267	1.01	894,169	1,010,701	1.13
amine	439,544	501,063	1.15	680,036	828,299	1.20
d salt	415,736	239,646	.55	1,054,476	490,941	.47

TABLE 7.—*Production of chemicals for sale for research and experimental purposes.*

Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.	
		Quantity.	Value.
		Lbs.	
Total		1,852	$39,721
Acetyl p-aminobenzoic acid	54		
Acetyl o-aminophenol	54		
Acetyl p-amino phenol	54		
Acetyl p-anisidine	54		
Acetyl anthranilic acid	54		
Acetyl phenylhydrazine	54		
Acetyl n-propylaniline	54		
Acetyl p-toluidine	54		
p-Aminoacetophenone	54		
m-Aminobenzoic acid	54		
p-Aminobenzoic acid	160		
p-Aminodimethylaniline hydrochloride	54		
4-Aminotoluene-2-sulphonic acid	54		
4-Amino-m-xylene	54		
Amino-p-xylene	54		
Anisic acid	54		
Anisole	54		
Azo-benzene	54		
Azoxybenzene	54		
5-Benzalamino-2-cresol	54		
p-Benzalaminophenol	54		
Benzal chloride	54		
Benzamide	54		
Benzanilide	54		
Benzene (cryst. thiophene, free)	54		
Benzene-azo-o-cresol	54		
Benzenesulfochloride	54		
Benzenesulfonamide	54		
Benzil	54, 150, 160		
a-Benzil dioxime	54		
Benzilic acid	54, 150, 160		
Benzoic anhydride	54		
Benzophenone	54, 150, 160		
Benzoin	54, 150		
Benzonitrile	54		
Benzoyl bromide	54		
Benzoyl a-naphthylamine	54		
Benzoyl piperidine	54		
Benzoyl o-toluidine	54		
Benzyl p-aminophenol hydrochloride	54		
Benzyl alcohol	x		
Benzylamine	150		
Benzyl bromide	54		
p-Bromoacetanilide	54, 160		
Bromoacetophenone	54		
3-Bromo-4-acetylaminotoluene	54		
3-Bromo-4-aminotoluene	54		
m-Bromoaniline	54		
p-Bromoaniline	54, 160		
p-Bromoaniline hydrochloride	54		
Bromonaphthalene	54		
p-Bromophenol	160		
p-Bromophenylhydrazine hydrochloride	54		
o-Bromotoluene	54, 160		
p-Bromotoluene	54		
n-Butyl aniline	54		
Butyl benzoate	54		
Butyl benzyl ether	54		
n-Butyl o-methoxybenzoate	54		
Butyl phenyl ether	54		
Butyl salicylate	54		
Butyranilide	54		
Carbanilide	54		
Catechol	54		
Chloranil	54		

Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.
		Quantity.
		Lbs.
p-Chloroacetanilide	54	
Chloroacetophenone	54	
o-Chloroaniline	54	
p-Chloroaniline	54	
o-Chlorobenzaldehyde	54	
p-Chlorobenzaldehyde	54	
o-Chlorobenzoic acid	54	
p-Chlorobenzoic acid	54	
p-Chlorobenzyl bromide	54	
Chlorohydroquinone	54	
6-Chloro-3-hydroxytoluene	54	
p-Chlorophenol	54	
o-Chlorotoluene	54	
p-Chlorotoluene	54	
m-Cresol	150	
o-Cresolsulfonephthalein	81	
p-Cresol (synthetic)	54, X	
o-Cresolphthalein	54	
o-Cresyl acetate	160	
o-Cresyl methyl ether	54	
m-Cresyl methyl ether	54	
p-Cresyl methyl ether	54	
o-Cresyl p-toluenesulfonate	54	
Diacetyl o-phenylenediamine	54	
p-p Diaminodiphenylmethane	54	
Dibenzylmalonic ester	160	
Dibromocresolsulfonephthalein	81	
2:4 Dibromophenol	160	
Dibromosulfonephthalein	81	
Dibutylaniline	54	
Di-n-butylaniline	160	
2:4 Dichloroaniline	54	
o-Dichlorobenzene (pure)	54	
Dihydronaphthalene	160	
p-Dimethylaminoazobenzene	54	
Dimethylaminobenzaldehyde	160	
m-Dimethylaminophenol	54	
p-Dimethylaminophenol sulfate	54	
2:4 Dimethylquinoline	54	
2:6 Dimethylquinoline	54	
2:4 Dimethylquinoline sulfate	54	
Dimethyl-p-toluidine	54	
2:4 Dinitrobenzoic acid	54	
3:5 Dinitrobenzoic acid	54	
Dinitrobenzoylene urea	54	
Dinitrohydroquinone diacetate	54	
Diphenyl	54	
Diphenylcarbazide	54	
Diphenylcarbonate	54	
Diphenylethylenediamine	54	
Diphenylnitrosamine	54	
Dipbenyl piperazine	54	
Diphenylsulfide	54	
Dipropylaniline	54	
Ethylbenzene	160	
Ethyl m-nitrobenzoate	54	
Ethyl p-nitrobenzoate	160	
Ethyl orange	54	
Eugenol methyl ether	54	
Formanilide	54, 160	
Hippuric acid	54, 160	
p-Hydrazinobenzoic acid	54	
Hydroquinone diacetate	54	

7.—*Production of chemicals for sale for research and experimental purposes, 1920*—Continued.

mon name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.	
		Quantity.	Value.
		Lbs.	
inone dimethyl	54	.....	.....
inone mono-l ether	54	.....	.....
xyazobenzene	54	.....	.....
xyphenylgly-	54	.....	.....
yquinoline	54	.....	.....
ene	54	.....	.....
nzoic acid	54	.....	.....
nzoic acid	54	.....	.....
nene	160	.....	.....
P	72	.....	.....
	150	.....	.....
ne	160	.....	.....
xybenzalde-	54	.....	.....
ybenzoic acid	54	.....	.....
yquinoline	54	.....	.....
stanilide	54	.....	.....
iline	54	.....	.....
-methoxyben-	54	.....	.....
-nitrobenzoate	160	.....	.....
nylhydrazine	54	.....	.....
quinoline	54	.....	.....
-toluidine	54	.....	.....
lene sulfo-	54	.....	.....
quinaldine	54	.....	.....
olbenzein	54	.....	.....
hyl iso-amyl	54	.....	.....
-4-acetylami-	54	.....	.....
aminotoluene	54	.....	.....
iline	54	.....	.....
isole	54	.....	.....
enzal chloride	54	.....	.....
nzoic acid	54	.....	.....
enzoic acid	54	.....	.....
benzoyl chlo-	54	.....	.....
benzoyl chlo-	54	.....	.....
nzyl bromide	54	.....	.....
nzyl chloride	54	.....	.....
romobenzene	54	.....	.....
omobenzene	54	.....	.....
omobenzene	54	.....	.....
iobenzene	54	.....	.....
dobenzene	54	.....	.....
Diphenylendo-drotriazole)	150	.....	.....
p henylhydra-	54	.....	.....
diethylaniline	54	.....	.....
-naphthol	54	.....	.....
luene	54	.....	.....
	54	.....	.....
	54	.....	.....
cetate	160	.....	.....
etonitrile	54	.....	.....
tyl chloride	54	.....	.....
lanine	160	.....	.....
minoacetic acid	160	.....	.....
nzoate	54	.....	.....
ydrazine	150, 160	.....	.....
yl hydroxyla-	150	.....	.....
ethyl carbinol	54, 160	.....	.....
phthalate	54	.....	.....

Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.	
		Quantity.	Value.
		Lbs.	
Phenylthiohydantoic acid	54	.....	.....
Phenyl p-toluenesulfonate	54	.....	.....
o-Phenylenediamine hydrochloride	54	.....	.....
Phloroglucinol	54, 150	.....	.....
Phthalyl chloride	54	.....	.....
a-Picoline	54	.....	.....
Picramide	54	.....	.....
Picryl chloride	54	.....	.....
Piperidine	54	.....	.....
Potassium hydrogen phthalate	54	.....	.....
Propionanilide	54	.....	.....
Propylaniline	54	.....	.....
Quinaldine	54, 160	.....	.....
Quinoline	54	.....	.....
Quinone	54	.....	.....
Resorcinol diacetate	54	.....	.....
Resorcinol dimethyl ether	54	.....	.....
Resorcinol monomethyl ether	54	.....	.....
Sodium o-dichlorobenzene sulfonate	54	.....	.....
Sodium 2:5 dichlorobenzene sulfonate	54	.....	.....
Sodium diethylaminobenzene sulfonate	54	.....	.....
Sodium m-dimethylaminobenzene sulfonate	54	.....	.....
Sodium m-ethylaminobenzene sulfonate	54	.....	.....
Sodium m-nitrobenzoate	54	.....	.....
Sodium o-xylene sulfonate	54	.....	.....
Sodium p-xylene sulfonate	54	.....	.....
Sulfosalicylic acid	54	.....	.....
o-Sulfobenzoic acid	81	.....	.....
o-Sulfobenzoic acid (ammonium salt)	81	.....	.....
o-Sulfobenzoic acid chloride of)	81	.....	.....
Tetrabromophenol sulfonephthalein	81	.....	.....
Terephthalic acid	54	.....	.....
Thiocarbanilide	150	.....	.....
p-Thiocresol	54	.....	.....
Thiophenol	54	.....	.....
Thymol sulfonephthalein	81	.....	.....
p-Toluene sulfonanilide	54	.....	.....
p-Toluene sulfonyl methylanilide	54	.....	.....
p-Toluenesulfonyl-p-toluidine	54	.....	.....
m-Toluidine	54	.....	.....
p-Tolylhydrazine hydrochloride	54	.....	.....
2:4:6 Trinitrobenzaldehyde	54	.....	.....
2:4:6 Trinitrobenzoic acid	54	.....	.....
Triphenylguanidine	54	.....	.....
Triphenylmethane	54	.....	.....
Veratrole	54	.....	.....
Xanthone	54	.....	.....
o-Xylene	54	.....	.....
m-Xylene	51	.....	.....
p-Xylene	54	.....	.....

DYES AND OTHER FINISHED COAL-TAR PRODUCTS.

INTRODUCTORY.

The production of dyes and other finished products during the calendar year 1920 is shown in Table 13, page 50, in as great detail as possible, without revealing the output of individual manufacturers. In Table 14, page 58, the production of individual dyes in 1920 is compared with the output for the same dye in 1919, in all cases where the figures could be published. These finished coal-tar products are divided into the following eight classes: (1) dyes, (2) color lakes, (3) photographic chemicals (developers), (4) medicinals, (5) flavors, (6) perfume materials, (7) synthetic phenolic resins, (8) synthetic tanning materials. In previous reports[1] the Commission has emphasized the close relationship that exists between the manufacture of explosives, poison gases and dyes, and the fact that many explosives plants since the signing of the armistice have been converted into dye factories. The dye industry is also closely connected with the manufactures of flavors, perfume materials, photographic chemicals, and other coal-tar products, which, although produced in smaller quantities than dyes, use many of the by-products obtained in the manufacture of coal-tar dyes.

The total output of dyes and other finished coal-tar chemicals in 1920 was 112,942,227 pounds, valued at $112,731,547, by 161 firms, as compared with 82,532,390 pounds, valued at $84,585,544, by 155 firms in 1919. This represents an increase of 37 per cent in quantity and of 33 per cent in value of these products.

DYES.

SUMMARY OF PRODUCTION IN 1920.

During 1920 the output of dyes in the United States showed, approximately, a 40 per cent increase both in quantity and value, the average unit value being practically the same (about $1.07 per pound) for 1920 and 1919. The production in 1920 was 88,263,776 pounds, valued at $95,613,749. This output was manufactured by 82 firms, which is 8 firms less than were making dyes in 1919.

The increase in output of dyes in 1920 may be accounted for largely by an increased production of the more important dyes which were being exported during 1920, and by the increased domestic output of vat dyes including indigo. The amount of indigo produced in 1920 was more than double the output in 1919, and there was a large increase in the production of sulphur black. The production of "vat dyes other than indigo" increased from about 390,000 pounds in 1919 to 1,160,000 pounds in 1920. This three-fold increase is accounted for largely by an increased output of a comparatively few dyes, as the class still lacks a variety of dyes.

Number of manufacturers of each dye.—The dyes manufactured in 1920 have been studied from the standpoint of the number of firms manufacturing each dye. The dyes have been classified as follows:

[1] Census of Dyes and Coal-Tar Chemicals, 1917, 1918, and 1919.

Those which were each manufactured by one firm only.
Those which were each manufactured by two firms only.
Those which were each manufactured by three or more firms.
Those which were each manufactured by five or more firms.
Those which were each manufactured by seven or more firms.

s information is shown in tabular form in Table 8. Such an sis shows that of 360 dyes produced in 1920, 108 individual representing 92 per cent of the total output of dyes in 1920, each manufactured by three or more firms. It is also seen that lyes, which, however, represented only 5 per cent of the total tity produced, were each made by only one firm. The number were each made by two firms was 52, or 3 per cent of the total t.

still greater significance is the fact that those dyes (35 in num- which represented slightly more than 50 per cent of the output each manufactured by seven or more separate firms. The dyes were each made by five or more firms represented about 60 nt of the total 1920 production.

8.—*Analysis of production of dyes in 1920 by number of manufacturers making each dye.*

tion of table: The dyes produced in 1920 are arranged in this table according to the number of manufacturing each individual dye. Column 2 shows the number of individual dyes which were manufactured by a corresponding number of separate firms in column 1. Column 3 shows the output in pounds of the number of dyes shown in column 2. Column 4 shows the percentage of the 1920 output of dyes represented by the quantity in column 3.]

Number of firms.	Dyes each made by number of firms in column 1.	Output of number of dyes in column 2.	
		Pounds.	Per cent.
1	2	3	4
.....	200	4,351,812	5
.....	52	2,441,000	3
.....	108	81,470,964	92
.....	59	55,205,751	63
.....	35	45,531,599	52
tal dyes produced in 1920.....	360	88,263,776	.....

ation of production to consumption.—The imports of dyes during amounted to 3,402,582 pounds, or only 4 per cent of the total tic output of dyes which was 88,263,776 pounds. During domestic exports of "aniline dyes" amounted to $22,450,480, he exports of "all other dyes and dyestuffs" (a large part of was undoubtedly coal-tar dyes) amounted to $7,373,111. xport of "aniline dyes" was 23 per cent of the value of domestic ction and the combined exports of "aniline dyes" and "all dyes and dyestuffs" was 31 per cent of the domestic output.

tariff act of September 8, 1916, provides that unless by Sep- r 8, 1921, the domestic industry shall produce 60 per cent of alue of the domestic consumption the specific duties on dyes no longer be assessed. In any event the specific duties begin- at said date are to be annually reduced by 20 per cent until duties shall no longer be assessed. That portion of the tariff

act of September 8, 1916, relating to these specific duties reads as follows:

> During the period of five years beginning five years after the passage of this act such special duties shall be annually reduced by 20 per cent of the rate imposed by this section, so that at the end of such period such special duties shall no longer be assessed, levied, or collected; but if, at the expiration of five years from the date of the passage of this act, the President finds that there is not being manufactured or produced within the United States as much as 60 per cent in value of the domestic consumption of the articles mentioned in Groups II (intermediates) and III (dyes and other finished products) of section 500, he shall by proclamation so declare, whereupon the special duties imposed by this section on such articles shall no longer be assessed, levied, or collected.

It is apparent, however, that the law is not clear or definite as to whether this should be applied to individual dyes or to dyes taken as a group. For the purpose of analysis it will be assumed that it applies to dyes taken as a group, and that domestic consumption is represented by production plus imports minus exports. On this basis, the consumption of dyes during 1920 amounted to $78,926,705, if the exports of "aniline dyes" alone are taken into consideration, or $71,553,595 if exports of "aniline dyes and all other dyes and dyestuffs" are taken as exports of coal-tar dyes (see p. 42 for explanation of exports of dyes). In the first case the domestic production of $95,613,749 of dyes would represent 120 per cent of domestic consumption and in the latter case, 133 per cent of the total domestic consumption.

PRODUCTION OF DYES BY CLASSES.

The dyes produced in the United States during 1920 have been classified according to method of application under the following classes: (1) Acid dyes; (2) basic dyes; (3) direct dyes; (4) lake and spirit soluble dyes; (5) mordant and chrome dyes; (6) sulphur dyes; (7) vat dyes, subdivided into indigo and other vats; and (8) unclassified dyes.

The production of dyes in the United States from 1917 to 1920, inclusive, and imports during the fiscal year 1914, and the calendar year 1920, are arranged according to the classes given above in Table 9, and are also shown graphically in figure 1.

Acid dyes.—As may be seen upon examination of Table 9 this class of dyes, totaling 17,741,538 pounds, ranks fourth in quantity of dyes produced in 1920. This class showed a 46 per cent increase over the production of 1919 and accounted for 20.1 per cent of the 1920 output. The prewar import (1914 fiscal year) of this group was 9,286,501 pounds as compared with only 733,405 pounds imported in 1920, which was about 4 per cent of the domestic output. This essential class, for wool and silk dyeing, constitutes one of the groups consumed in the largest quantity. The first dyes made in the United States during the war period were largely acid colors of a simple type which when dyed on the fabric, were generally fugitive. While the 1917 census shows a comparatively large production of acid dyes, totaling 9,372,121 pounds—an actual increase over the 1914 imports—the lack of variety resulted in their indiscriminate use regardless of adaptability and caused a rather lasting prejudice on the part of the public against American-made dyes. The developments in the years 1918, 1919, and 1920 have culminated in a greatly increased variety of acid dyes made in quantities adequate—or nearly so—for domestic consump-

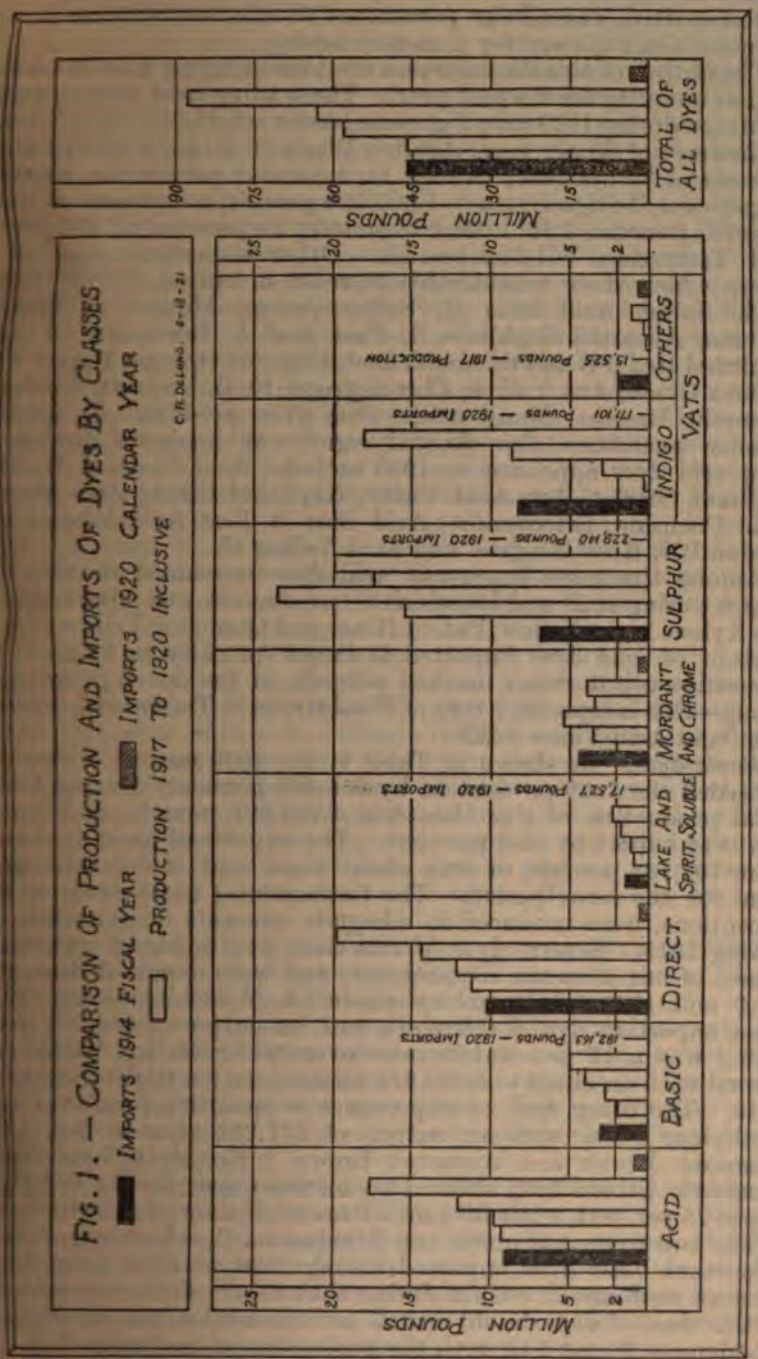


FIG. 1. — COMPARISON OF PRODUCTION AND IMPORTS OF DYES BY CLASSES
IMPORTS 1914 FISCAL YEAR
IMPORTS 1920 CALENDAR YEAR
PRODUCTION 1917 TO 1920 INCLUSIVE
C.R. DELONG 4-18-21
MILLION POUNDS
25
20
15
10
5
2
ACID
BASIC
DIRECT
LAKE AND SPIRIT SOLUBLE
MORDANT AND CHROME
SULPHUR
INDIGO
OTHERS
VATS
TOTAL OF ALL DYES
182,163 POUNDS — 1920 IMPORTS
17,527 POUNDS — 1920 IMPORTS
228,140 POUNDS — 1920 IMPORTS
171,101 POUNDS — 1920 IMPORTS
15,525 POUNDS — 1917 PRODUCTION
90
75
60
45
30
15

tion. In 1920, 119 acid colors, of which 76 were identified by Schultz, were reported, and a large percentage of this number were produced in quantities sufficient for domestic needs.

The output of this class shows a most encouraging gain in variety as well as quantity for the past year. The leading acid dyes in quantity produced during 1920 were Nigrosine (water soluble), 2,743,021 pounds, an increase of 65 per cent; Agalma Black 10 B, 2,608,864 pounds, an increase of 39 per cent; Orange II, 1,850,341 pounds, an increase of 66 per cent; Indigo Extract, 1,395,000 pounds, a decrease of 300,000 pounds; Ponceau 2 R, 1,286,002 pounds, an increase of 130 per cent; and Tartrazine, 701,722 pounds. Other important dyes of this group which show considerable increase in output during 1920 include Sulfon Acid Blue R, Sulfoncyanine, Metanil Yellow, Azo Rubine, Alizarine Saphirole B, Fast Red A, Bordeaux B, Amidonaphthol Red 6 B and G, Acid Violet, Croceine Orange, Paper Yellow, Guinea Green, Azo Yellow, Chromotrope 10 B, Victoria Violet, and Resorcin Brown. Many other acid dyes produced in somewhat smaller quantities also showed significant increases during 1920. New acid dyes appearing in 1920 include: Acid Violet 4 B, Double Brilliant Scarlet, Azo Acid Violet, Naphthol Black, Azo Mauve B, Acid Fuchsine, Eriocyanine, Acid Blue B, Fast Acid Violet A 2 R, Eosine BN, Rose Bengale, and Acid Yellow G.

Among the more important acid dyes consumed in the United States during 1920 and for which no production was reported in 1920 are Xylene Light Yellow, Patent Blues, and Quinoline Yellow. A comparison of acid dyes imported in larger quantity in 1920 with the domestic output shows marked progress in the development of this group—this is especially true of Wool Green S, Tartrazine, Sulfoncyanine, and Acid Violet 4 BN.

Basic dyes.—As shown in Table 9, the 1920 output of basic dyes exceeded the 1919 production by 956,469 pounds. During 1920 the total production of this class was 4,993,001 pounds, and exceeded the 1914 import by 66.3 per cent. The imports of basic dyes in 1920 were 192,163 pounds, or only about 4 per cent of domestic production, for the same period. The fundamental basic dyes, with few exceptions, were produced in adequate amounts for domestic needs during 1919. Several dyes of this class were made in quantities in excess of our domestic requirements and were exported during both 1919 and 1920. In quantity produced, Malachite Green was the most important dye in this class, with an output of 654,237 pounds, which was a 17 per cent increase over 1919. Methyl Violet ranked second with an output of 600,873 pounds, only a slight increase over 1919. The other dyes of importance in quantity produced include Methylene Blue, with an output of 577,264 pounds, followed by Bismarck Brown and Bismarck Brown 2 R. Methylene Blue and Bismarck Brown both showed an increase over the 1919 output of about 25 per cent, while Bismarck Brown 2 R showed a slight decrease.

The two dyes, Auramine and Rhodamine B, which were the most important basic dyes imported during 1920, showed a considerable increase in domestic output during that year. Future developments in this class of dyes should include an increased output of Phosphine, Rhodamine B and 6 G, with the production of Indamine 6 R.

Direct dyes.—The direct dyes ranked second in quantity of output, totaling in 1920, 19,882,631 pounds, or nearly double the imports

in 1914. This group accounted for 22.5 per cent of the total dyes manufactured in 1920. The imports of direct dyes in 1920 were 571,581 pounds, or slightly less than 3 per cent of the domestic production. An examination of the direct colors made in 1920 reveals an increased output of many of the faster substantive dyes, which were produced in only small amounts in the previous year. This has resulted in a better balanced output and variety of direct dyes, based on domestic requirements. Several of the fundamental direct dyes were made in amounts largely in excess of the 1914 imports and were among the the principal dyes imported during 1920.

Of the total direct dyes, Direct Deep Black EW made up 39 per cent, the 1920 figures showing 7,736,994 pounds, an increase in quantity of 486,987 pounds as compared with 1919. Erie Direct Black RX ranks second in this class, with a production of 2,050,741 pounds in 1920—the largest increase in output of any individual dye (except indigo) made in 1920. Benzo Blue 2 B ranked third in this class, the total output for 1920 being 1,789,774 pounds, valued at $1,576,259, an increase of 30 per cent. Among the dyes of this class which showed a large output in 1920 and an increase over 1919 were the following colors, with the indicated percentage increase over 1919: Benzazurine G, increased by 58 per cent; Benzo Purpurine 4 B, 114 per cent; Congo Corinth G, 76 per cent; Congo Red, 72 per cent; Chrysophenine G, 185 per cent; Diamine Brown, 1,516 per cent; Oxamine Black BHN, 66 per cent, and Oxamine Green B, increased by 37 per cent.

Direct dyes reported for the first time in 1920 and which could be identified according to Schultz Tables included Benzo Brown B, Chrysamine R, Cotton Yellow R, Dianil Blue R, Diphenyl Brown 3GN, Oxamine Blue 4 R, Stilbene Yellow and Thiazol Yellow RH. In addition there were many important direct dyes which were unidentified by Shultz Tables, some of which were produced in large quantities. An important example of this class is Zambesi Black V, which is in demand for dyeing union (cotton and silk) hosiery. In some cases new trade names were used so that no comparison could be made with the prewar equivalent type. These dyes are included in the totals.

Direct dyes which showed a marked decrease during 1920 include Chloramine Black N, Primuline, Direct Yellow R, Benzo Blue 3 B, Oxamine Green GX, and Chloramine Green B.

Direct dyes constituted 16.8 per cent of the total imports of dyes in 1920. An examination of the direct colors imported in 1920 indicates that they were either not made in the United States or were made only in inadequate quantities. The production of these dyes will be necessary for a completely balanced and well-developed domestic dye industry.

Color lake and spirit soluble dyes.—This group of dyes with an output of 2,205,281 pounds accounted for 2.5 per cent of the 1920 output, and was 1.4 times the imports of 1914. The imports of lake and spirit soluble dyes were only one-half of 1 per cent of the total quantity of dyes imported in 1920. This class is smallest in quantity consumed and produced, but are essential materials for the large American industries manufacturing varnishes, paints, and lithographic inks.

Of the spirit soluble dyes, Nigrosine (spirit soluble) leads, with an output of 919,242 pounds, an increase of 166 per cent over that of 1919. Other important spirit soluble dyes made in 1920 include Sudan II, 170,658 pounds; Induline (spirit soluble), 140,400 pounds; Sudan I, 116,624 pounds; Sudan III and IV, Butter Yellow and Spirit Yellow R. The output of Induline (spirit soluble), Sudan IV, Spirit Yellow R, Aniline Blue, and Spirit Yellow showed a considerable decrease in 1920 as compared with 1919. Important dyes used in the manufacture of color lakes reported in 1920 include Lithol Red R, Permanent Red 4 B, Lake Red D and C, and Helio Fast Red. The production figures for these dyes, however, can not be published.

Mordant and chrome dyes.—This class of dyes includes many of the fastest known colors. They are essential for fast shades on woolens and, to a lesser extent (in the case of mordant dyes), in calico printing. The total output in 1920 was 3,900,209 pounds, or 4.4 per cent of the total production. This is a slight decrease in quantity from the previous year's output, and may be compared with 4,450,442 pounds imported in 1914. Imports of this class of dyes in 1920 amounted to 709,482 pounds, or 20.9 per cent of the total import and 18 per cent of domestic production in 1920.

In this group the dyes identified by Schultz Tables, in general, show comparatively few conspicuous increases in output, while a few show large decreases. The production figures for a large part of the unidentified mordant dyes, and for identified dyes made by three or less producers, can not be published without revealing the individual output of the different firms; hence production of only a comparatively few dyes in this group could be published. Some of the faster and more valuable chrome colors produced in considerable quantity were among the unidentified dyes and it is these dyes which showed encouraging progress during 1920.

Many of these mordant and chrome dyes are the most difficult and costly to develop with the possible exception of the vat dyes. There is still lacking in quantity and variety essential colors in this class, which should be included in future developments. An adequate supply of anthraquinone is necessary for the manufacture of the alizarin dyes included in this group. Certain of the mordant and chrome dyes are used in relatively small amounts, and it is natural from a manufacturing standpoint that they should be left until the last.

In this group, Salicine Black U lead in quantity produced with a total of 1,074,248 pounds, an increase of 45 per cent over the 1919 output. Among the more important identified dyes in this group are Diamond Black F, Metachrome Brown B, Diamond Black PV (first reported in 1920), Alizarin, Erio Chrome Black T, Palatine Chrome Red B, Alizarin SX, and Delphine Blue B. Considerable decreases were shown in 1920 as compared with 1919 in the output of Gallocyanine, Erio Chrome Black T and Erio Chrome Black A.

The first seven mordant and chrome dyes imported in largest quantity during 1920 were: Anthracene Blue WR, Alizarin, Alizarin Blue S, Acid Alizarin Black SE, Alizarin Blue Black, Alizarin Direct Green G, and Delphine Blue B. Four of these seven dyes were produced in the United States in 1920; the output, however, was not equal to the domestic demand.

Sulphur dyes.—Sulphur dyes continued to lead in quantity of output. This class, since 1917, has been produced in large excess of the 1914 imports. In 1920 the total output of sulphur dyes was 20,034,500 pounds, an increase of 14 per cent over that of 1919 and nearly three times the importation of this class of dyes during 1914. Sulphur dyes constituted 22.7 per cent of the total dyes produced in 1920. The American industry has been especially successful in the development of this class of dyes. These dyes were an important factor in our export trade of dyes in 1920.

Sulphur Black has always been the most important sulphur dye produced in the United States and prior to 1920 was manufactured in larger quantity than any other dye. During 1920, however, the output of Indigo exceeded by 1,873,194 pounds the production of Sulphur Black which was 16,305,037 pounds, an increase of 12 per cent over that of 1919.

Next to Sulphur Black the sulphur blues ranked second in quantity produced; the 1920 output was 1,514,811 pounds, a decrease of 7 per cent from that of 1919. Sulphur browns showed an increase of 57.5 per cent compared with the 1919 output, the output for 1920 was 1,269,731 pounds. The most important developments in this class during 1920 were large increases in the output of sulphur maroons and sulphur yellows.

Of the sulphur dyes imported in 1920, Thional Brown and Thional Yellow were the most important. This class, however, constituted only 6.7 per cent of the total dyes imported during 1920, and was only slightly more than 1 per cent of the domestic output of sulphur dyes.

Vat dyes.—The production of vat dyes in 1920 showed a larger increase over 1919 than any other group. The progress in this class of dyes may be considered the most conspicuous development in 1920. Indigo alone exceeded the 1919 output by 9,314,407 pounds, and was the largest individual color produced in 1920. The increase in output of "vat dyes, other than indigo," compared with the previous year was 770,710 pounds. Several dyes of this group were produced in excess of the 1914 imports. This increase may be accounted for by a few dyes and therefore there still exists a lack of variety in this class. The quantity produced in the case of certain of the dyes in this group is still inadequate.

The production of Indigo (20 per cent paste) was greater in both quantity and value than that of any other individual dye. In 1920, 18,178,231 pounds valued at $13,497,981 were manufactured as against 8,863,824 pounds valued at $5,233,719 in 1919. In 1914, when all Indigo was imported, the imports were 8,407,359 pounds. These figures would indicate a considerable export trade in this dyer.

The output of the Brom-indigos showed a very large increase. Conspicuous increases were also shown in the manufacture of Indanthrene Blue GCD, the most important vat dye other than Indigo, and in the output of Indanthrene Yellow. The figures for the domestic production for these colors, however, can not be revealed. The following vat dyes, some of which were produced in considerable quantity, were first reported in 1920: Hydron Blue R; Indanthrene Blue BO; Indanthrene Violet 2 R; Indanthrene Black; Indanthrene Blue RS; Algol Yellow R, and Indanthrene Brown B.

This class of dyes was (with the exception of indigo) the last to be developed because of their complexity, high cost of manufacture, scarcity of anthracene, German control of patents until October, 1917, and relatively small consumption (vat dyes other than indigo constituted only 4 per cent of the imports in 1914). The progress during 1920 in this class of dyes is of great credit to the technical skill of the American dye industry and the manufacture of more than eighteen million pounds of Indigo may be regarded as the outstanding achievement of the American dye industry. A balanced production of vat dyes will include the future manufacture of vat scarlets and pinks (thioindigoids), with an increase in the output of such dyes as Indanthrene Blue GCD, Indanthrene Violet 2 R and B, Indanthrene Yellow G and R, Indanthrene Golden Orange R, Hydron Blue G and R, and Helindone Brown.

TABLE 9.—*Comparison of imports 1914 and 1920 with the production of dyes 1917 to 1920, inclusive, by classes.*

Class.	1914 (fiscal year).		1917		1918	
	Imports.	Per cent of total.	United States production.	Per cent of total.	United States production.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
Acid	9,286,501	20.2	9,372,121	20.4	9,799,071	16.8
Basic	3,002,480	6.5	2,073,043	4.5	2,879,639	4.9
Direct	10,264,757	22.3	11,181,761	24.3	12,285,683	21.1
Lake and spirit soluble	1,512,605	3.3	934,360	2.2	1,068,466	1.8
Mordant and chrome	4,450,442	9.7	4,164,902	9.1	5,447,192	9.3
Sulphur	7,051,879	15.4	15,588,222	33.9	23,698,826	40.5
Vats (including indigo)	10,352,093	22.5	289,296	.6	3,281,337	5.6
(a) Indigo	8,407,359	18.3	271,771	.....	3,083,888	5.3
(b) Other vats	1,945,304	4.2	14,525	.....	197,449	.3
Unclassified	27,568	.1	2,368,541	5.0	4,232	.....
Total	45,950,895	100.0	45,977,246	100.0	58,464,446	100.0

Class.	1919		1920			
	United States production.	Per cent of total.	United States production.	Per cent of total.	Imports.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
Acid	12,195,968	19.2	17,741,538	20.1	733,405	21.5
Basic	4,036,532	6.4	4,933,001	5.7	192,163	5.7
Direct	14,444,994	22.8	19,882,631	22.5	571,581	16.8
Lake and spirit soluble	1,813,199	2.8	2,205,281	2.5	17,527	.5
Mordant and chrome	3,985,050	6.3	3,909,209	4.4	709,482	20.9
Sulphur	17,024,418	27.8	20,044,500	22.7	229,140	6.7
Vats (including indigo)	9,252,982	14.6	19,338,099	21.9	932,464	27.4
(a) Indigo	8,863,824	14.0	18,178,231	20.6	171,101	22.4
(b) Other vats	389,158	.6	1,159,868	1.3	761,363	5.0
Unclassified	49,111	.1	168,517	.2	16,820	.5
Total	63,402,191	100.0	88,235,776	100.0	3,402,582	100.0

IMPORTANT DYES IMPORTED.

Table 10 shows a comparison of the dyes of each class imported in the largest quantity during 1920, with the domestic production for the same year in case the figures can be published. This gives an indication of the more important requirements of the domestic consumer not adequately met by the domestic dye manufacturer.

the case of acid dyes, the 10 leading dyes in quantity imported nted for more than 61 per cent (450,767 pounds) of a total of)5 pounds imported during 1920. Four of these were manu-ed in the United States during the same year in quantities lerably in excess of imports.

the group of basic dyes the first six dyes in quantity imported up 77 per cent of the total of 192,163 pounds. Only two of were not made in the United States during 1920.

ong the direct dyes, the first 12 in quantity imported totaled 84 pounds, or about 50 per cent of the 571,581 pounds in this imported during 1920. Three of these were produced in the d States.

e first 11 mordant and chrome colors imported in 1920 made up r cent of the total of 709,482 pounds imported. Six of these were factured in the United States during the same year.

sulphur dyes made up 162,766 pounds, or 71 per cent of the sulphur dyes of 229,140 pounds imported in 1920. Similar types ese sulphur dyes with one exception were made in the United s.

e first 15 vat dyes in quantity imported totaled 745,560 pounds, per cent of the total vat colors imported in 1920. Seven of dyes were made in the United States in 1920, but in inadequate nts with the exception of indigo.

10.—*Comparison of dyes imported in largest quantity with domestic production, 1920, by classes.*

Class and name of dye.	1920	
	Production.	Imports.
ACID DYES.	*Pounds.*	*Pounds.*
Wool Green S	212,362	127,764
Xylene Light Yellow	.....	77,782
Tartrazine	701,722	47,877
Patent Blue A	.....	44,801
Patent Blue	.....	36,420
Quinoline Yellow	.....	34,440
Xylene Blue V. S	.....	27,254
Acid Violet 4 B. N	(1)	23,335
Sulfoncyanine	675,078	18,327
Xylene Fast Green	.....	12,767
BASIC DYES.		
Auramine	(1)	74,414
Rhodamine B	(1)	24,709
Phosphine	(1)	19,529
Victoria Blue	(1)	11,782
Indomine 6R	.....	9,681
Rhodamine 6G	.....	8,574
DIRECT DYES.		
Zambesi Black	(1)	41,670
Trisulfone Brown	.....	38,616
Trisulfone Brown G. G	.....	38,411
Pyrazol Orange G	.....	24,329
Benzo Fast Scarlet	.....	24,153
Chloramine Brilliant Red	.....	23,375
Columbia Black	(1)	23,350
Diaminogene B	.....	18,120
Dianol Red 2B	.....	17,632
Diamine Fast Blue	.....	11,617
Thiazol Yellow	(1)	11,182
Brilliant Congo R	.....	11,129

[1] Production in the United States, but figures not publishable.

TABLE 10.—*Comparison of dyes imported in largest quantity with domestic production, 1920, by classes*—Continued.

Schultz No.	Class and name of dye.	1920	
		Production.	Imports.
	MORDANT AND CHROME DYES.	Pounds.	Pounds.
789	Anthracene Blue W. R.	(1)	105,913
778	Alizarin	(1)	73,228
804	Alizarin Blue S.	.....	45,679
288	Acid Alizarin Black S. E.	.....	34,322
865	Alizarin Direct Green G.	(1)	31,852
622	Delphine Blue B.	76,719	28,643
862	Alizarin Blue Black.	.....	28,837
858	Alizarin saphirol B.	(1)	28,219
140	Erio Chrome Blue Black B. C.	29,255	20,771
774	Alizarin Black.	.....	17,422
788	Alizarin Cyanine.	.....	16,781
	SULPHUR DYES.		
747	Thional Brown.	(1)	43,210
.....	Thional Yellow.	(1)	26,056
.....	Thional Brilliant Green.	(1)	26,806
.....	Thional Green.	(1)	24,049
.....	Thionine Green.	(1)	18,747
.....	Cross Dye Green.	.....	15,598
	VAT DYES.		
874	Indigo.	18,178,231	171,102
842	Indanthrene Blue, G. C. D.	(1)	147,699
768	Indanthrene Black.	(1)	84,165
849	Indanthrene Yellow.	(1)	75,085
767	Indanthrene Violet R. R.	(1)	40,732
881	Ciba Blue 2B.	.....	35,867
761	Indanthrene Gold Orange R.	.....	33,338
910	Helindone Pink.	.....	27,163
907	Ciba Scarlet G.	.....	25,573
748	Hydron Blue.	(1)	19,299
901	Ciba Violet B.	.....	18,287
920	Helindone Violet.	.....	16,852
838	Indanthrene Blue R. S.	(1)	16,285
873	Helindone Brown A. N.	.....	15,290
836	Helindone Brown 3 G. N.	.....	15,238

[1] Production in the United States, but figures not publishable.

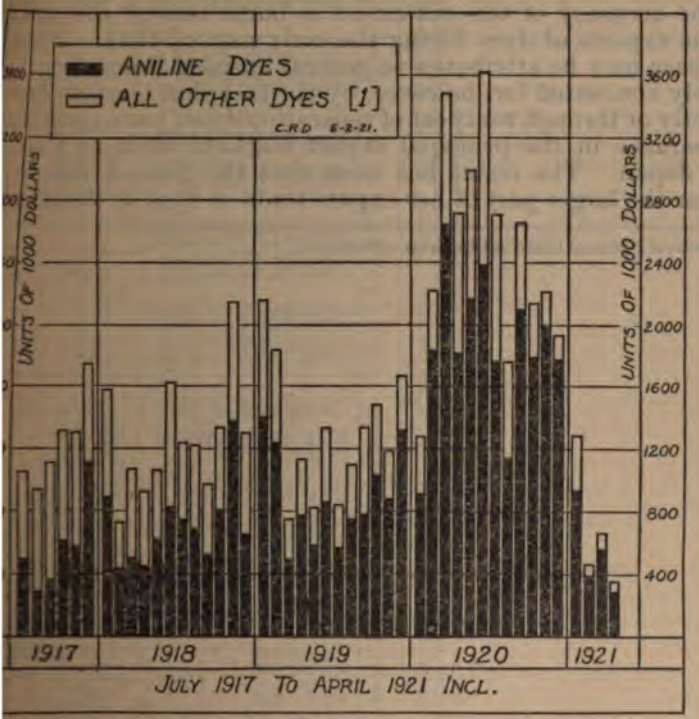
DOMESTIC DYES EXPORTED FROM THE UNITED STATES.

The Commerce Department reports exports of domestic "dyes and dyestuffs," which classification is further divided into three groups—(1) aniline dyes, (2) logwood extract, (3) all other dyes and dyestuffs. Under this third classification there may be reported both natural dyes, other than logwood extract, and coal-tar dyes. Logwood extract, however, is by far the most important natural dye exported from the United States, and it is, therefore, reasonable to assume that a large part of "all other dyes and dyestuffs" represents coal-tar dyes. Table 11 shows by months the total export of dyes from the United States, and this same information is shown graphically in Figure 2. The countries to which dyes are exported from the United States are shown in detail in Part IV, Appendix.

Omitting from consideration the export of "all other dyes and dyestuffs," the trend of the export of "aniline dyes" in recent years is interesting. During 1918 and 1919 the exports of "aniline dyes" amounted to $8,629,611 and $10,724,071, respectively. During these years the exports by months ranged from a minimum of $441,704 in February, 1918, to a maximum of $1,377,623 in November, 1918. During 1920 (calendar year) the exports of aniline dyes showed an increase of more than 100 per cent over those of 1919, or, in other

s, they amounted to $22,450,480. The maximum export in one month during 1920 was $2,648,615 in March. During the four months of 1921 the exports of aniline dyes showed a marked ne. During the month of April (the last month for which s are available) the exports of "aniline dyes" amounted to $305,760, or only slightly more than 10 per cent of the maximum hly export during 1920. The export of aniline dyes during , 1921, was about equal to the lowest monthly export during the

FIG. 2.—VALUE OF DOMESTIC EXPORTS OF DYES BY MONTHS



stic exports of dyes, as shown by the Commerce Department, are divided into 3 groups—(1) (2) logwood extract, and (3) all other dyes and dyestuffs.
assification may include both natural dyes (other than logwood extracts, shown separately), -tar dyes. Since logwood extract, however, is the most important natural dye exported from ates, it is reasonable to assume that a considerable portion of "all other dyes and dyestuffs" l-tar dyes.

lf of 1917, when the domestic industry was not as highly d as at present (1921).

xport of "all other dyes and dyestuffs" (a large part of which otedly coal-tar dyes) is taken into consideration, the decrease tal exports during the first four months of 1921 follows very ne decrease of "aniline dyes" alone. The export during this

period of aniline dyes and all other dyes and dyestuffs amounted t
$2,797,774, as compared with $9,741,077 during the same period
1920. During the month of April, 1921, the total exports of the
two groups amounted to $365,010, or about 10 per cent of the max
mum monthly export of $3,628,706 during June, 1920.

The Tariff Commission in its "Census of Dyes and Coal-T
Chemicals, 1919", made the following statement:[1]

> In estimating the significance of this achievement of the domestic industry in
> exportation of dyes it should be remembered that domestic manufacturers duri
> and 1920 have met little competition in foreign markets from German dye
> should also be pointed out that any deductions as to competitive strength of
> domestic industry which are based on exports of dyes do not take into consider
> the fact that the domestic industry is still deficient in the important group of vat
> alizarin dyes.

The accuracy of this statement is borne out by the rapid decl
in the exports of dyes during the early part of 1921. Although t
decrease may be attributed to general business depression, it may
largely accounted for, however, by the fact that German dyes (ei
directly or through reexport of reparation dyes) have again made th
appearance in the principal export markets, such as China, In
and Japan. The result has been that the United States has l
by far the larger part of her export trade in dyes in these markets.

[1] Census of Dyes and Coal-Tar Chemicals ,1919, p. 11.

Month.	1917			1918			1919			1920			1921		
	Aniline dyes.	All other dyes.	Total of aniline and all other.	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.	Aniline dyes.	All other dyes.	Total of aniline and all other.	Aniline dyes.	All other dyes.	Total of aniline and all other.	Aniline dyes.	All other dyes.	Total of aniline and all other.
January	.....	.....	.....	$893, 760	$688, 958	$1, 582, 718	$1, 405, 017	$755, 382	$2, 160, 399	$917, 574	$372, 468	$1, 290, 042	$943, 595	$349, 114	$1, 292, 709
February	.....	.....	.....	441, 704	297, 278	738, 982	1, 231, 355	617, 050	1, 848, 405	1, 850, 662	379, 825	2, 230, 487	397, 123	72, 641	469, 764
March	.....	.....	.....	552, 285	526, 400	1, 078, 685	492, 291	278, 591	770, 882	2, 648, 615	850, 695	3, 499, 310	574, 969	95, 322	670, 291
April	.....	.....	.....	453, 326	479, 428	932, 754	777, 123	359, 512	1, 136, 635	1, 829, 771	891, 467	2, 721, 238	305, 760	59, 250	365, 010
May	.....	.....	.....	626, 204	447, 898	1, 074, 102	585, 970	239, 744	825, 714	2, 180, 606	817, 713	2, 998, 319	.....	.....	.....
June	.....	.....	.....	828, 801	797, 403	1, 626, 204	858, 661	475, 571	1, 334, 232	2, 389, 515	1, 239, 191	3, 628, 706	.....	.....	.....
July	$497, 106	$576, 579	$1, 073, 685	753, 236	486, 690	1, 239, 926	574, 274	267, 425	841, 699	1, 770, 780	947, 411	2, 718, 191	.....	.....	.....
August	304, 768	644, 949	949, 717	695, 472	530, 133	1, 225, 605	761, 009	350, 491	1, 111, 500	1, 151, 196	623, 181	1, 774, 377	.....	.....	.....
September	371, 565	757, 467	1, 129, 032	528, 207	449, 295	977, 502	785, 497	557, 005	1, 342, 502	2, 114, 915	551, 113	2, 666, 028	.....	.....	.....
October	623, 586	695, 489	1, 319, 075	816, 377	532, 841	1, 349, 218	1, 037, 708	453, 390	1, 491, 098	1, 802, 142	334, 167	2, 136, 309	.....	.....	.....
November	582, 725	733, 008	1, 315, 733	1, 377, 623	757, 488	2, 135, 111	887, 710	300, 041	1, 187, 751	2, 006, 534	211, 465	2, 217, 999	.....	.....	.....
December	1, 122, 468	639, 253	1, 761, 721	662, 616	643, 097	1, 305, 713	1, 327, 456	350, 226	1, 677, 682	1, 788, 170	154, 415	1, 942, 585	.....	.....	.....
Total	3, 502, 218	4, 046, 745	7, 548, 963	8, 629, 611	6, 636, 909	15, 266, 520	10, 724, 071	5, 004, 428	15, 728, 499	22, 450, 480	7, 373, 111	29, 823, 591	.....	.....	.....

[1] Commerce and Navigation lists under domestic exports of "dyes and dyestuffs"—"aniline dyes," "logwood extract," and "all other dyes and dyestuffs." Under this latter designation may be included both natural and coal-tar dyes. However, since logwood extract—shown separately—is the most important natural dye exported from the United States, it may be assumed that a considerable portion of the exports under "all other dyes and dyestuffs" are coal-tar dyes.

PRODUCTION OF DYES IN GERMANY.

Beginning with February, 1920, detailed statements of one-quarter of the monthly production (this portion is required to be reserved for optional purchases of the Allied and Associated Governments by the Peace Treaty, Annex VI, part II) of dyes in Germany were made to the Reparations Commission. Copies of these monthly statements from February, 1920, to March, 1921, inclusive, have been received by the Department of State, which has given permission for their publication by the Tariff Commission. A summary of these reserve stocks, containing the monthly reserve for each class of dyes, according to application, is shown in Table 12.

Production of dyes in Germany during the first year after the signing of the armistice was practically negligible compared with the prewar output. During February, 1920, the quantity of dyes reserved by German plants for the allies totaled 876,449 pounds, indicating a total output of over three and one-half million pounds for that month. A progressive increase is shown for each following month, reaching a maximum output of 3,026,247 pounds in August, 1920, which corresponds to a total output of over 12,000,000 pounds monthly. During the remainder of 1920 the fluctuation varied from a minimum of 2,674,710 pounds in December, to a maximum of 2,978,806 pounds in November. The total quantity of dyes reserved by the German plants from February to December, inclusive, 1920, was 25,842,201 pounds, which corresponds to a production of 103,368,804 pounds. The reserved production receded from a maximum of 3,026,247 pounds in August, 1920, to an output of 2,669,096 pounds for January, 1921, and to 1,976,094 pounds for February. The total quantity of dyes reserved by the German plants for the allies for the first three months in 1921 was 6,828,278 pounds.

This rate of output in the first three months of 1921 is less than one-half the German prewar exports of coal-tar dyes. The total quantity of stocks reserved from February 1920 to March, 1921, inclusive, was 32,670,479 pounds.

It is of particular interest in examining the output of the different classes of dyes, according to application, that the production based upon the above monthly reports shows a large output of acid, direct and sulphur colors, and indigo paste, whereas there is a small production of vat dyes, Indanthrene Blue, G. C. D., Alizarin, and Alizarin colors other than Alizarin Red. The German production program has apparently resulted in the larger output of those types of dyes made in America, with a minimum output of the dyes either not made in the United States or made in quantity insufficient to meet domestic needs.

TABLE 12.—*One-quarter of production in German dye plants* [1] *reserved for purchase of Allied and Associated Governments, February, 1920 to March, 1921.*

[Pounds.]

Group.	Classification of colors.	1920					
		February.	March.	April.	May.	June.	July.
I	Alizarin red	28,629	100,347	79,070	124,401	241,194	206,251
II	Indigo paste	33,203	124,258	306,371	338,318	291,294	543,747
III	Vat colors, except Indanthrene Blue G C D	15,346	9,361	19,577	62,183	41,786	72,595
IV	Indanthrene Blue G C D	3,135	.....	3,307	9,489	11,329	14,420
V	Alizarin colors other than red	17,240	22,862	40,622	54,643	92,022	63,411
VI	Direct colors for cotton	262,123	346,301	400,221	451,138	541,534	694,700
VII	Direct colors for diazotization	63,402	51,495	54,586	44,687	88,131	126,983
VIII	Acid colors for wool	149,827	202,819	265,094	360,192	419,842	512,594
IX	Chrome colors for wool	61,313	91,257	95,605	132,287	182,647	195,246
X	Basic colors	19,912	44,374	72,289	106,555	124,035	126,723
XI	Sulphur colors	163,822	149,452	235,423	190,515	305,979	323,170
XII	Lake colors	56,958	164,229	156,163	150,085	170,742	136,196
XIII	Intermediate products	1,539	12,599	85,527	89,672	.....	.....
	Total	876,449	1,319,354	1,813,855	2,114,165	2,510,535	3,016,045

Group.	Classification of colors.	1920					Total for 11 months, 1920.
		August.	September.	October.	November.	December.	
I	Alizarin red	210,328	198,632	215,028	235,775	191,056	1,830,721
II	Indigo paste	777,774	642,729	426,599	635,419	373,803	4,493,515
III	Vat colors, except Indanthrene Blue G C D	54,828	62,608	84,366	88,440	66,938	578,028
IV	Indanthrene Blue G C D	9,370	16,043	1,131	3,554	21,867	93,645
V	Alizarin colors other than red	69,612	88,658	58,440	59,698	42,306	609,514
VI	Direct colors for cotton	573,004	593,694	666,239	648,946	600,257	5,778,166
VII	Direct colors for diazotization	113,973	95,439	117,562	117,653	103,409	977,320
VIII	Acid colors for wool	469,589	492,647	487,131	518,041	486,258	4,364,034
IX	Chrome colors for wool	200,504	208,760	216,057	163,304	224,272	1,771,252
X	Basic colors	144,595	163,661	151,145	139,805	164,207	1,257,301
XI	Sulphur colors	291,832	285,804	262,744	276,510	320,659	2,805,910
XII	Lake colors	110,838	73,565	92,690	91,661	79,668	1,282,795
XIII	Intermediate products	.....	.....	.....	.....	.....	.....
	Total	3,026,247	2,922,240	2,779,132	2,978,806	2,674,710	25,842,201

Group.	Classification of colors.	1921			Total for 3 months, 1921.
		January.	February.	March.	
I	Alizarin red	137,999	35,077	74,103	247,179
II	Indigo paste	630,621	529,970	608,849	1,769,440
III	Vat colors, except Indanthrene Blue G C D	50,150	69,754	53,797	173,701
IV	Indanthrene Blue G C D	1,759	2,811	2,917	7,487
V	Alizarin colors other than red	43,563	12,560	22,090	78,213
VI	Direct colors for cotton	512,056	350,355	421,938	1,284,349
VII	Direct colors for diazotization	132,239	52,589	52,128	236,956
VIII	Acid colors for wool	479,602	358,821	390,547	1,228,970
IX	Chrome colors for wool	154,342	98,764	106,751	359,857
X	Basic colors	128,962	159,426	153,423	441,811
XI	Sulphur colors	285,498	207,532	204,609	697,639
XII	Lake colors	112,305	98,435	91,936	302,676
XIII	Intermediate products	.....	.....	.....	.....
	Total	2,669,096	1,976,094	2,183,088	6,828,278

[1] Peace Treaty, Annex VI, Part II.

OTHER FINISHED COAL-TAR PRODUCTS.

Color lakes.—The coal-tar products included in this group are a class of pigments used for paints, lithographic inks, and many other purposes. They are made by fixing a coal-tar dye on an inert base material, such as aluminum hydroxide or barium sulphate. In certain cases a finished coal-tar dye may be used, while in other cases the dye may be made at the time of fixation, such as paranitraniline red from betanaphthol and p-nitroaniline.

In 1920, 10,983,538 pounds of color lakes, valued at $5,871,820, were produced in this country. This represents a 45 per cent increase in quantity over that of 1919. Of the various special groups of color lakes reported the "red lakes" are first, with a total output of 4,410,797 pounds, followed—in order of amount produced—by para red lakes, 970,589 pounds; scarlet lakes, 783,011 pounds, maroon lakes, 740, 765 pounds; blue lakes and eosine lakes.

Photographic chemicals.—The total production of coal-tar chemicals used as photographic developers was 440,759 pounds, valued at $1,015,848, a slight increase in quantity and a slight decrease in value compared with the 1919 figures. Of the four coal-tar photographic developers reported, hydroquinone leads, with an output of 411,019 pounds, an increase of 51 per cent over that of 1919. Methyl p-aminophenol sulfate (metol) decreased 51 per cent to 28,831 pounds. This decrease may be accounted for largely by competition from imported metol. The output of p-aminophenol sulfate also decreased. The price per unit of each of these three developers decreased, and the unit price per pound of the entire group of photographic chemicals showed a decrease from $3.16 per pound in 1919 to $2.30 per pound in 1920. Methyl o-aminophenol (ortol) was produced for the first time in 1920.

Medicinals.—The total output of coal-tar medicinals in 1920, including disinfectants, was 5,184,989 pounds, valued at $5,726,776, compared with 6,777,988 pounds, valued at $7,883,071, in 1919. The production of disinfectants in 1919 was 2,103,101 pounds. There was a large decrease in the output of disinfectants in 1920, but the figures are not publishable. The technical skill and research required in the manufacture of the variety of coal-tar medicinals in this group has been one of the great accomplishments of the American coal-tar industry. A well-developed output of coal-tar medicinals is essential to the country's welfare.

As in the previous year the leading coal-tar medicinal in quantity and value was acetylsalicylic acid (aspirin), with a production of 1,708,436 pounds, valued at $1,472,493, a slight decrease in quantity, with a large reduction in value from $2.27 to 86 cents per pound in 1919. Acetanilide ranked second in quantity, with an output of 1,255,140 pounds, a 37 per cent increase over that of 1919. From a medicinal standpoint, arsphenamine (salvarsan) may be considered the most important coal-tar product in this group. The output of this product by three manufacturers in 1920 was 605 pounds, valued at $380,136, which was a slight decrease from the output in 1919. The following medicinals showed a large increase in output compared with that of the previous year: Salol, sodium salicylate, benzyl benzoate, phenol sulfonates (calcium, sodium, and zinc, etc.).

Coal-tar medicinals reported for the first time in 1920 include acetamidosalol, ammonium benzoate, benzyl alcohol, benzyl valerate, cinnamic acid, refined creosote, guaiacol benzoate, lithium benzoate, mercuric benzoate, mesotan, novaspirin, phloroglucinol, acriflavine, and proflavine, salophen, and tolysin (p-methyl phenyl cinchoninic acid ethyl ether).

Flavors and perfume materials.—These two classes of coal-tar chemicals have no sharp line of demarcation, as many coal-tar products are used as both flavors and perfumes, and a separate classification is, in certain cases, somewhat arbitrary. The total quantity of flavors produced in 1920 showed a 73 per cent reduction, due to the greatly diminished output of saccharin, although the *number* of flavors nearly doubled, compared with 1919.

Saccharin, chiefly used as a sugar substitute and tobacco sweetener, totaled 137,315 pounds, valued at $418,757, a 75 per cent decrease in quantity, with an increase in unit value from $1.85 to $3.05 per pound. Coumarin, used both as a soap perfume and in the preparation of vanilla extracts, also showed a greatly reduced output. The new flavors reported in 1920 were benzyl acetate, benzyl cinnamate, cinnamyl propionate, ethyl cinnamate, methyl phthalate, and vanilidine.

The production of perfume materials was 99,740 pounds, valued at $332,008, a 138 per cent gain in quantity compared with that of 1919, and the number increased from 24 to 41. The following perfume materials were reported for the first time in 1920: Acetophenone, aubepine (anisic aldehyde), cinnamic aldehyde, diphenyl methane, ethyl benzoate, ethyl phthalate, isobutylphenyl acetate, methyl benzoate, methylbenzyl acetate, methyl cinnamate, methyl indol, phenylpropyl acetate, styrene, isobutylsalicylate, methyl guaiacol, benzylidine acetone, and methyl paracresol.

Synthetic resins.—The coal-tar resin industry is a distinctly American discovery and development, and has resulted only from the most careful research and engineering skill. These products were first made by the condensation of phenol with formaldehyde and ammonia or with hexamethylenetetramine. In later years cresol has been used as a base and also para-coumarone. In 1920 the output of synthetic resins totaled 4,659,680 pounds, valued at $3,410,179, a 50 per cent increase in quantity over 1919. These products are used as an amber substitute in making pipe stems and cigarette holders and similar articles. They are also of especial importance as electrical insulating materials and in the manufacture of varnishes and lacquers.

Synthetic tanning materials.—Four firms reported the production of 3,142,861 pounds of synthetic tanning materials, valued at $233,874, a large increase compared with that of 1919, when only one maker reported these products. Synthetic tans, made by the condensation of certain coal-tar derivatives with formaldehyde in the presence of an acid, are of recent development. The large expansion in 1920 in this new branch of the coal-tar chemical industry is one of the conspicuous developments of that year, and these products promise to become important materials in the tanning industry.

TABLE 13. *Production of finished coal-tar products during 1920.*

[The number in the first column identifies the dye according to the 1914 edition of the Schultz tables. T
second column gives the common name of the dye. The numbers in the third column refer to the n
here alphabetical list of manufacturers printed on p. 116. An X signifies that the corresponding prod
was made by a manufacturer who did not consent to the publication of his identification number in t
nection therewith. Blanks in the fourth and fifth columns indicate that there was actual produc
during 1920, but that the figures can not be published without revealing information in regard to
output of individual firms. The figures thus concealed are, however, included in the totals.]

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.		Aver pric per pou
			Quantity.	Value.	
	Total finished coal-tar products.		*Pounds.* 112,962,227	$112,731,547	
	NITROSO DYES.				
4	Naphthol Green	7, 52, X			
	NITRO DYES.				
5	Picric Acid	33			
7	Naphthol Yellow	78, 89, X, X			
8	Pigment Chlorine	33			
	STILBENE DYES.				
9	Direct Yellow R	7, 25, 33, 55, 112, 117, 127, 142	348,849	330,336	
10	Stilbene Yellow	51			
11	Chloramine Orange G	7, 55, 59, 117	38,287	72,063	
	PYRAZOLONE DYES.				
23	Tartrazine	22, 23, 60, 112, 152	701,722	1,202,646	
	AZO DYES.				
	Monazo dyes.				
31	Spirit Yellow	25			
32	Butter Yellow	8, 25, 33, 35, 60, 89, 112, 117, X	74,152	108,476	
33	Chrysoidine Y	25, 33, 51, 64, 69, 84, 112	585,648	399,799	
34	Chrysoidine R	25, 33, 51, 64, 69, X	146,703	140,621	
36	Sudan I	25, 35, 60, 112, 114	116,634	140,630	
37	Cresotine Orange	7, 33, 92, 112, 141	96,573	100,158	
38	Orange G	7, 22, 33, 25, 51, 112, 141	120,874	147,190	
40	Chromotrope 2 R	112, 117			
41	Fast Acid Fuchsine B	25, 112, 117	30,678	80,724	
42	Amino Naphthol Red G	7, 30, 64, 112	132,637	226,564	
48	Alizarin Yellow GG	7, 23, 33, 35, 64, 79, 114, 123, 142, 170, X.	211,580	134,021	
51	Thiazol Yellow RH	30			
56	Paranitraniline Red	142			
57	Chromotrope 2 B	22, 117			
58	Alizarin Yellow R	7, 23, 38, 64, 76, 79, 111, 142, 170, X.	83,331	71,291	
61	Victoria Violet	112, 117			
64	Lava Fuchsine	117			
65	Azo Coralline	30, 64			
66	Amino Naphthol Red 6 B	30, 64, 112, 114	142,567	215,976	
67	Chromotrope 6 B	7, 112, 117			
68	Spirit Yellow R	35, 112			
70	Brilliant Orange O	31			
73	Helio Fast Red	142			
76	Sudan II	27, 35, 60, 112	170,658	243,667	
79	Xylidine Orange 2 R	7, 25			
82	Ponceau 2 R	7, 23, 25, 33, 112, 117, 141, X	1,285,032	1,024,440	
83	Ponceau 3 R	60, 112, X			
88	Acid Anthracene Brown R	112			
89	Metachrome Brown B	7, 22, 23, 51, 76	192,911	168,053	
102	Diamond Flavine G	22			
106	Acid Red R L P	25, 142			
107	Sulphamine Brown A	141			
112	Bordeaux B	7, 23, 25, 33, 92, 117, 141	217,408	202,873	
119	Diamine Rose	18, 55, 112			
120	Salmon Red	33			
134	Metanil Yellow	33, 49, 51, 52, 64, 112	620,437	1,031,223	
137	Acid Yellow G	52, 60			
138	Methyl Orange	124			
141	Azo Yellow	52, 64, 112			
143	Tropaeoline	7, 60			
144	Orange I	23, 25, 60, 112, X	11,681	76,036	
145	Orange II	23, 25, 33, 35, 51, 64, 69, 112, 114, 118, 123, X.	1,850,341	1,142,245	

TABLE 13.—*Production of finished coal-tar products during 1920*—Continued.

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920. Quantity.	Total production, 1920. Value.	Average price per pound.
	AZO DYES—continued.				
	Monazo dyes—Continued.		*Pounds.*		
151	Orange R	69			
152	Permanent Red 4 B	33			
153	Lake Red C	33, 96, 105			
154	Palatine Chrome Brown	22			
155	Acid Alizarin Garnet R	22, 112			
156	Palatine Chrome Violet	22, 112			
157	Diamond Black PV	112			
159	Acid Alizarin Black R	22			
160	Fast Brown N	64			
161	Fast Red A	7, 22, 23, 25, 33, 51, 69, 92, 112, 123, 141, X.	433,989	$452,698	$1.04
163	Azo Rubine	7, 25, 33, 51, 59, 64, 92, 112, 117.	470,949	673,305	1.43
164	Fast Red VR	59, 112			
166	Fast Red E	7			
167	Croceine Scarlet 3 BX	33			
168	Amaranth	23, 25, 33, 51, 67, 89, 92, 112, 117, 141, 163, X.	204,958	431,564	2.11
169	Cochineal Red	25, 33, 51, 92, 112, 141	288,945	363,766	1.26
173	Lithol Red R	33, 141, X			
174	Double Brilliant Scarlet	33			
177	Mordant Yellow	7, 33			
180	Eriochrome Blue Black B	22, 64, 114	29,255	37,231	1.27
181	Salicine Black U	7, 22, 25, 33, 51, 52, 59, 64, 92, 112, 114, 117, 141, X.	1,074,248	1,182,698	1.10
183	Eriochrome Black T	22			
184	Eriochrome Black A	22			
188	Sulphon Acid Blue R	7, 59, 64, 112	454,185	886,588	1.95
189	Sulphon Acid Blue B	112			
190	Benzo Brown 5 R	33, 59, 127	2,987	5,022	1.68
193	Stanley Red	127			
194	Thiazine Red R	33, 117			
195	Rosophenine 8G	33, 55, 59, 127	19,639	47,631	2.43
196	Titan Red	33			
197	Thiazine Red G	59, 64, 127	13,988	31,139	2.23
198	Mimosa C	18, 127			
199	Cotton Yellow R	127			
200	Lake Red D	158			
202	Palatine Chrome Red B	112, 141, 158	67,817	135,142	1.99
	All other monoazo dyes	7, 8, 22, 23, 30, 33, 35, 38, 67, 69, 76, 89, 92, 112, 117, 124, 141, X.	933,717	1,409,245	1.51
	Total monoazo dyes		11,916,939	14,671,649	1.23
	Disazo dyes.				
206	Leather Brown	141			
211	Resorcin Brown	7, 112			
213	Fast Brown	7, 112			
217	Agalma Black 10 B	7, 8, 14, 22, 25, 33, 38, 51, 64, 76, 84, 92, 112, 117, 123, X.	2,608,864	3,377,007	1.29
223	Sudan III	25, 33			
224	Cloth Red G	33			
227	Brilliant Croceine	25, 33, 112, 141	129,124	287,654	2.23
229	Azo Acid Violet	30			
232	Sudan IV	33, 35, 69			
233	Cloth Red B	33			
235	Croceine 3 B	33			
236	Wool Red	112			
241	Neutral Gray G	117			
246	Cloth Scarlet G	52, 69			
247	Scarlet EC	52, 112			
257	Sulphocyanine	51, 64, 112			
261	Buffalo Black 10 B	33, 112			
264	Fast Sulphon Black F	22			
265	Sulphocyanine Black	112			
266	Naphthylamine Black	7, 33			
269	Naphthol Black	117			
275	Diamond Black	112			
283	Bismark Brown	14, 25, 33, 35, 51, 55, 64, 84, 112, X, X.	514,218	431,191	.84
284	Bismark Brown 2 R	25, 51, 52, 64, 69, 84, 112	484,929	441,567	.91
289	Paper Yellow	51, 112, 117, X	91,218	109,263	1.19

TABLE 18.—*Production of finished coal-tar products during 1920.*

[The number in the first column identifies the dye according to the 1914 edition of the Schultz tables. second column gives the common name of the dye. The numbers in the third column refer to the bered alphabetical list of manufacturers printed on p. 116. An X signifies that the corresponding pr was made by a manufacturer who did not consent to the publication of his identification number in nection therewith. Blanks in the fourth and fifth columns indicate that there was actual produ during 1920, but that the figures can not be published without revealing information in regard t output of individual firms. The figures thus concealed are, however, included in the totals.]

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.		Aw pr p pa
			Quantity.	Value.	
			Pounds.		
	Total finished coal-tar products.		112,942,227	$112,731,547	
	NITROSO DYES.				
4	Naphthol Green	7, 52, X			
	NITRO DYES.				
5	Picric Acid	33			
7	Naphthol Yellow	78, 89, X, X			
8	Pigment Chlorine	33			
	STILBENE DYES.				
9	Direct Yellow R	7, 25, 33, 55, 112, 117, 127, 142	348,849	830,836	
10	Stilbene Yellow	51			
11	Chloramine Orange G	7, 55, 59, 117	38,287	72,063	
	PYRAZOLONE DYES.				
23	Tartrazine	22, 23, 89, 142, 153	701,732	1,302,646	
	AZO DYES.				
	Monazo dyes.				
31	Spirit Yellow	25			
32	Butter Yellow	8, 25, 33, 35, 60, 89, 112, 117, X	74,162	168,476	
33	Chrysoidine Y	25, 32, 51, 64, 69, 84, 112	585,648	599,799	
34	Chrysoidine R	25, 32, 51, 64, 69, X	195,783	146,681	
36	Sudan I	25, 35, 69, 112, 114	116,624	149,639	
37	Crocein Orange	7, 33, 92, 112, 141	96,573	100,158	
38	Orange G	7, 22, 23, 25, 51, 112, 141	120,574	147,199	
40	Chromotrope 2 R	112, 117			
41	Fast Acid Fuchsine B	25, 112, 117	30,678	80,724	
42	Amino Naphthol Red G	7, 59, 64, 112	132,637	226,584	
48	Alizarin Yellow GG	7, 23, 33, 38, 64, 79, 114, 123, 142, 170, X.	211,590	134,021	
51	Thiazol Yellow RH	59			
56	Paranitraniline Red	142			
57	Chromotrope 2 B	22, 117			
58	Alizarin Yellow R	7, 23, 38, 64, 76, 79, 141, 142, 170, X.	83,334	71,291	
61	Victoria Violet	112, 117			
64	Lana Fuchsine	117			
65	Azo Coralline	59, 64			
66	Amino Naphthol Red 6 B	59, 64, 112, 114	142,567	215,976	
67	Chromotrope 6 B	7, 112, 117			
68	Spirit Yellow R	35, 112			
70	Brilliant Orange O	33			
73	Helio Fast Red	142			
76	Sudan II	25, 35, 69, 112	170,658	243,667	
79	Xylidine Orange 2 R	7, 25			
82	Ponceau 2 R	7, 23, 25, 33, 112, 117, 141, X	1,286,002	1,024,440	
83	Ponceau 3 R	69, 112, X			
88	Acid Anthracene Brown R	112			
89	Metachrome Brown B	7, 22, 23, 51, 76	192,911	168,053	
102	Diamond Flavine G	22			
106	Autol Red RLP	25, 142			
107	Sulphamine Brown A	141			
112	Bordeaux B	7, 23, 25, 33, 92, 117, 141	217,496	262,873	
119	Diamine Rose	18, 55, 112			
120	Salmon Red	33			
134	Metanil Yellow	33, 49, 51, 52, 64, 112	629,437	1,031,223	
137	Acid Yellow G	52, 69			
138	Methyl Orange	124			
141	Azo Yellow	52, 64, 112			
143	Tropaeoline	7, 69			
144	Orange I	23, 25, 89, 112, X	11,684	76,026	
145	Orange II	23, 25, 33, 35, 51, 64, 69, 112, 114, 118, 123, X.	1,850,341	1,142,245	

TABLE 13.—*Production of finished coal-tar products during 1920*—Continued.

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.		Average price per pound.
			Quantity.	Value.	
	TRIPHENYLMETHANE—contd.		*Pounds.*		
503	Brilliant Milling Green B	112			
505	Light Green	89, 163			
506	Erioglaucine	112			
511	Para-fuchsine	130			
512	Magenta (or Fuchsine)	14, 33, 49, 51, 69, 80, 112, 130, 141, 154, X, X.	284,285	$1,328,646	$4.67
513	New Fuchsine	112, 146			
515	Methyl Violet	25, 33, 49, 69, 75, 112, 118, 154, X.	600,873	1,436,182	2.39
516	Crystal Violet	22, 51			
521	Aniline Blue	33, 141, X			
524	Acid Fuchsine	80			
527	Acid Violet 4 B	30			
528	Fast Acid Violet 10 B	30, 51, 117			
530	Acid Violet	30, 59, 112	144,207	749,470	5.20
531	Eriocyanine	112			
536	Alkali Blue	33, 49, 69, 80, 112, 118, 130, 141, 154, X.	74,253	437,895	5.90
537	Methyl Blue For Silk	80			
539	Soluble Blue	49, 69, 80, 118	98,770	468,295	4.74
	All other triphenylmethane dyes.	22, 30, 33, 112	60,190	154,288	2.56
	Total triphenylmethane dyes.		2,482,169	10,130,336	4.08
	DIPHENYL- NAPHTHYL-METHANE DYES.				
559	Victoria Blue B	22, 51			
565	Acid Blue B	146			
566	Wool Green S	7, 22, 51, 59, 64, 114	212,362	1,060,269	4.99
	Total diphenyl-naphthyl-methane dyes.		383,383	1,941,724	5.06
	XANTHONE DYES.				
573	Rhodamine B	37, 51			
582	Fast Acid Violet	94			
587	Eosine	51, 69, 118, X	85,489	358,280	4.19
589	Eosine SP	51			
590	Eosine BN	94			
592	Erythrosine B	23, 51, 69, 89, 118, X	6,874	56,093	8.16
593	Phloxine P	51			
595	Rose Bengale	51			
599	Galliene	158			
600	Coeruleine B	158			
	All other xanthone dyes	118			
	Total xanthone dyes		215,044	1,156,039	5.38
	ACRIDINE DYES.				
606	Phosphine	49, 69			
	All other acridine dyes	112			
	THIOBENZENYL DYES.				
615	Thioflavine S	127			
616	Primuline	18, 51, 59, 112, 127, 169, X	183,179	291,980	1.59
617	Columbia Yellow	18, 59, 112, 117, 127, 169	100,248	237,076	2.36
	All other thiobenzenyl dyes	127			
	INDOPHENOL DYES.				
619	Indophenol	14, 92			
	OXAZINE AND THIAZINE DYES.				
622	Delphine Blue B	8, 38, 112, 114	76,719	237,719	3.10
626	Gallocyanine	7, 8, 23, 38	70,169	214,506	3.06
631	Chromocyanine V	112			
649	Cotton Blue	92, 112			
659	Methylene Blue	23, 25, 38, 51, 89, 99, 112, 133, 164, 169, X, X.	577,264	1,695,381	2.94
667	Brilliant Alizarine Blue	64			
	All other oxazine and thiazine dyes.	X			
	Total oxazine and thiazine dyes.		786,720	2,330,140	2.96

TABLE 13.—*Production of finished coal-tar products during 1920*—Continued.

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.		Average price per pound.
			Quantity.	Value.	
	AZINE DYES.		*Pounds.*		
672	Azo Carmine	51			
679	Safranine	27, 75, 112, 133, X	149,629	$380,126	$2.55
681	New Fast Gray	23, 38, 35, 117, X	31,620	77,373	2.45
683	Safranine MN	112			
697	Induline (spirit soluble)	18, 25, 33, 35, 64, 69	140,460	170,861	1.21
698	Nigrosine (spirit soluble)	18, 23, 25, 35, 64, 69, 112, 114	919,242	812,079	.88
697 698	Induline Nigrosine Base B	112			
699	Induline (soluble in water)	18, 64, 69, 112	168,048	173,022	1.03
700	Nigrosine (soluble in water)	18, 23, 64, 69, 112, 114	2,743,021	1,987,963	.72
	SULPHUR DYES.				
730	Sulphur Black	14, 33, 35, 51, 64, 73, 92, 112, 115, 169, 170, K	16,305,087	4,158,241	.25
	Sulphur Blue	14, 17, 36, 45, 51, 75, 92, 112, 117	1,514,811	1,464,731	.98
	Sulphur Brown	33, 35, 36, 39, 51, 55, 64, 75, 92, 112, 115, 136, X, K, X	1,269,731	441,877	.35
	Sulphur Green	33, 35, 36, 38, 51, 64, 75, 92, 112, 117	177,027	242,674	1.36
	Sulphur Maroon	38, 51, 55	133,407	216,220	1.62
	Sulphur Olive	38, 64, X	129,582	58,549	.45
	Sulphur Tan	33, 36, 64, K	95,038	44,873	.47
	Sulphur Yellow	14, 35, 38, 51, 64, 112, 115, X	408,987	291,538	.71
	Total sulphur dyes		20,034,509	6,936,763	.35
	ANTHRAQUINONE DYES.				
748	Hydron Blue R	51, 112			
763	Indanthrene Dark Blue BO	51, 117			
765	Indanthrene Green B	51, 117			
767	Indanthrene Violet RR	51			
768	Indanthrene Black	51			
778	Alizarin	17, 112			
779	Alizarin Orange	112			
782	Alizarin Brown	38, 51, 158, 171	42,840	72,001	1.68
784	Alizarin SX	112			
789	Anthracene Blue WR	17, 112			
817	Algol Yellow R	84			
838	Indanthrene Blue RS	117			
842	Indanthrene Blue GCD	51, 117			
849	Indanthrene Yellow	51, 117			
858	Alizarin Saphirol B	112			
865	Alizarin Direct Green G	55			
957	Indanthrene Brown B	117			
	All other anthraquinone dyes	112			
	INDIGO AND ITS DERIVATIVES.				
874	Indigo, Synthetic	50, 51, 112	18,178,231	13,497,981	.74
877	Indigotine and Indigo extract	7, 15, 23, 51, 89, 97, 112, 154	1,395,000	1,401,478	1.00
879 880 883	Brom Indigos	50			
	ANILINE BLACK GROUP.				
922	Aniline Black	33			
923	Oxol	51, 61, 154	168,459	358,065	2.13
	PHOTOCHEMICAL DYES.				
	Erstman Yellow	54			
	Methyl Red	54			
	Orange II	54			
	Orthochrome T bromide	54			
	Pinacyanol Chloride	54			
	Propyl Red	54			
	Sodium salt p-dimethylamine-azo-benzene-p-carboxylic acid	54			
	Sodium p-nitrobenzeneazo salicylate	54			
	Sodium p-phenolazobenzene sulfonate	54			
	Bacteriological stains	9			
	Unclassified dyes of unknown composition	171, X			
	Total dyes		88,263,776	95,613,749	1.08

TABLE 13.—*Production of finished coal-tar products during 1920*—Continued.

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920. Quantity.	Total production, 1920. Value.	Average price per pound.
	COLOR LAKES.		*Pounds.*		
	Black lakes	7, 38, 70, X	382,277	$52,140	$0.14
	Blue lakes	11, 20, 31, 38, 48, 51, 53, 56, 70, 82, 88, 93, 103, 138, 142, 143, 144, 148, 157, 158, 168, X, X, X, X, X, X, X, X, X, X.	645,647	457,570	.71
	Brown lakes	88, 142, 143, X, X	113,630	10,688	.09
	Eosine lakes	11, 20, 31, 48, 51, 53, 56, 70, 82, 88, 93, 95, 103, 138, 141, 142, 143, 144, 148, 157, 168, X, X, X, X, X, X, X, X, X, X.	606,618	585,133	.96
	Green lakes	11, 20, 31, 48, 51, 53, 70, 82, 88, 93, 103, 142, 143, 144, 148, 168, X, X, X, X, X, X, X, X, X, X.	431,970	228,898	.53
	Lithol red	11, 20, 48, 56, 70, 82, 88, 93, 95, 103, 138, 141, 142, 143, 148, 157, 158, 168, X, X, X, X, X, X, X.	496,600	486,427	98
	Maroon lakes	5, 11, 20, 31, 48, 51, 53, 70, 82, 88, 90, 93, 103, 141, 142, 143, 148, 157, 168, X, X, X, X, X.	740,765	316,122	.43
	Orange lakes	11, 20, 31, 53, 95, 103, 138, 142, 158, X, X, X, X, X, X.	339,275	120,183	.35
	Para red	95, 103, 165, 168, X, X, X, X, X.	970,589	269,922	.28
	Paranitraniline toner	165, X			
	Purple	158, 168			
	Red lakes	5, 11, 20, 31, 48, 51, 53, 56, 70, 82, 88, 90, 93, 103, 138, 141, 142, 143, 144, 148, 157, 158, X, X, X, X, X, X, X, X, X, X, X, X, X.	4,410,797	2,000,067	.47
	Scarlet lakes	5, 11, 20, 48, 51, 53, 56, 70, 82, 88, 90, 93, 103, 138, 141, 142, 144, 157, 165, 168, X, X, X, X, X, X, X, X, X, X, X.	783,011	318,283	.41
	Toluidine lakes	X, X, X			
	Violet lakes	11, 20, 31, 48, 53, 56, 70, 82, 88, 93, 95, 103, 138, 142, 143, 144, 148, 157, X, X, X, X, X, X, X, X, X, X.	336,969	459,735	1.36
	Yellow lakes	11, 31, 48, 51, 56, 70, 75, 82, 88, 93, 103, 141, 142, 143, 144, 148, 157, X, X, X, X, X, X, X.	536,122	334,845	.61
	All other lakes	X			
	Total color lakes		10,983,538	5,871,820	.53
	PHOTOGRAPHIC CHEMICALS.				
	p-Aminophenol sulphate	23			
	Diaminophenol hydrochloride	124			
	Hydroquinone	106, 112, 136, 171, X	411,019	807,345	1.96
	Methyl p-amidophenol sulphate (metol)	54, 136, 145, X	28,831	202,917	7.04
	Methyl o-aminophenol (ortol)	54			
	Totalphotographic chemicals		440,750	1,015,848	2.30
	MEDICINALS.				
	Acetamidosalol	128			
	Acetanilide, U. S. P	4, 89, 100, 106, 110, X, X	1,255,140	631,040	.50
	Acetylsalicylic acid (aspirin)	4, 44, 50, 71, 110, 125, X	1,708,436	1,472,403	.86
	Acriflavine	1, 72, 161			
	Ammonium benzoate	140			
	Ammonium salicylate	71			
	Anesthesine	1, 23			
	Arsphenamine	47, 104, 108	605	380,136	628.32
	Benzylalcohol	161			
	Benzyl benzoate	1, 9, 32, 57, 65, 161	36,164	98,080	2.71

TABLE 13.—*Production of finished coal-tar products during 1920*—Continued.

Schultz No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.		Average price per pound.
			Quantity.	Value.	
	MEDICINALS—continued.		*Pounds.*		
	Benzyl valerate	161			
	Bismuth betanaphthol	106, X			
	Bismuth tribromphenol	57, 100, 106			
	Chloramine T	23, 110			
	Cinchophen	1, 23			
	Cinnamic acid	23			
	Creosote carbonate	23, 51, 128			
	Creosote refined	117			
	Dibrom oxy mercury fluorescein and sodium salt of	81			
	Dichloramine T	110			
	Dihydroxyquinoline sulphate	21			
	Disinfectant	X			
	Guaiacol benzoate	140			
	Guaiacol carbonate U. S. P	51			
	Guaiacol crystals	51, 117			
	Guaiacol liquid	117			
	Halazone	23, 110			
	Lithium benzoate	34, 140			
	Magnesium salicylate	71			
	Mercuric benzoate	140			
	Mesotan	X			
	Methyl salicylate	32, 50, 71, 106, 149, X, X	603, 759	$432, 423	$ .72
	Methylene Blue	89, 99			
	b-Naphthol benzoate	23, 57, 106			
	Neoarsphenamine	47, 108			
	Novaspirin	74			
	Phenolsulfonates (calcium, sodium, zinc, etc.)	1, 101, 106, X	181, 516	79, 956	.44
	Phenolsulfonephthalein	81			
	Phenylcinchoninic acid (atophan)	89			
	Phloroglucinol C. P	89			
	Procaine	1, 23, 108			
	Proflavine	1, 72			
	Salol	71, 106, 110, 125	281, 279	251, 146	.89
	Salophen	X			
	Sodium salicylate	50, 57, 71, 106, 110, 125, X	450, 764	242, 104	.54
	Strontium salicylate	71			
	Tolysin (p-Methyl phenyl cinchoninic acid ethyl ether)	23			
	Total medicinals		5, 184, 989	5, 726, 776	1.10
	FLAVORS.				
	Benzyl acetate	161			
	Benzyl cinnamate	149, 161			
	Cinnamyl propiocate	161			
	Coumarin (synthetic)	34			
	Ethyl benzoate	34, 57, 89, 140, 149, 161, X, X	3, 468	6, 656	1.92
	Ethyl cinnamate	57, 89, 149, 161, X	512	3, 327	6.50
	Ethyl salicylate	57, 149, X, X	177	335	1.89
	Methyl benzoate	34			
	Methyl cinnamate	32, 57, 89, 149, X	951	6, 856	7.21
	Methyl phthalate	X			
	Methyl salicylate (see Medicinals).				
	Saccharin	23, 71, 136, X, X	137, 315	418, 757	3.05
	o-Toluene-sulfamide	58			
	Vanillidine	161			
	Total flavors		166, 884	527, 493	3.16
	PERFUME MATERIALS.				
	Acetophenone	57, 89, 149, 161, X	742	5, 160	6.96
	Amyl salicylate	32, 57, 71, 149, 161, X	14, 982	30, 585	2.05
	Anbepine (anisic aldehyde)	57, 58, 149, 161, X	2, 917	13, 053	4.43
	Benzyl acetate	32, 57, 65, 89, 149, 161, X, X	33, 764	56, 781	1.68
	Benzyl benzoate	32, 57, 89, 149, 161, X, X	11, 307	35, 910	3.17
	Benzyl butyrate	57			
	Benzyl formate	32, 149			
	Benzyl propionate	32, 57			
	Benzyl valerate	57			
	Benzylidine acetone	149			
	Bromo styrol	32, 57, 89, 149, 161	1, 446	11, 218	7.76

TABLE 13.—*Production of finished coal-tar products during 1920*—Continued.

Analysis No.	Common name.	Manufacturers' identification Nos., p. 116.	Total production, 1920.		Average price per pound.
			Quantity.	Value.	
	PERFUME MATERIALS—contd.		*Pounds.*		
	Butylphenyl acetate	161			
	Cinnamic aldehyde	32, 57, 58, 149, 161, X	1,324	$7,419	$5.60
	Diethyl phthalate	32, 57, 161			
	Dimethyl anthranilate	119, 161			
	Diphenylmethane	89, 149, 161	554	1,267	2.29
	Diphenyl oxide	32, X			
	Ethyl anthranilate	57, 161			
	Ethyl benzoate	161			
	Ethylphenyl acetate	32			
	Ethyl phthalate	89			
	Isobutylphenyl acetate	57			
	Isobutyl salicylate	149			
	Methyl acetophenone	57			
	Methyl anthranilate	32, 57, 89, 149, 161, X	2,351	23,665	10.06
	Methyl benzoate	140, 149, 161			
	p-Methylbenzyl acetate	161			
	Methyl cinnamate	161			
	Methyl guaiacol	149			
	Methyl indol	89			
	Methylphenyl acetate	32, 57, 161			
	Methylparacresol	149			
	b-Naphthol ethyl ether (neroline).	X			
	b-Naphthol methyl ether (yara yara).	149, X			
	Phenylacetic aldehyde	32, 57, 89, 149, 161, X	2,221	58,957	26.55
	Phenylethyl acetate	32, 57, 149, 161	78	3,026	38.80
	Phenylethyl alcohol	32, 50, 57, 149, 161	243	5,330	21.93
	Phenylpropyl acetate	57			
	Rose aldehyde	161			
	Salicylic aldehyde	32, 57, X			
	Styrene	161			
	Total perfumes		99,740	332,008	3.32
	SYNTHETIC PHENOLIC RESINS.				
	Derived from coumarone	15			
	Derived from cresol	33, 132, X			
	Derived from phenol	36, 132, X	1,163,967	1,503,348	1.29
	Total resins		4,659,680	3,410,179	.73
	SYNTHETIC TANNING MATERIALS.				
	Barretan	13			
	Cresotan	X			
	Liberty extract	92			
	Synex	X			
	Total tanning materials		3,142,861	233,674	.07

TABLE 14.—*Comparison of production of finished coal-tar products, 1919 and 1*

[For detailed production in 1920, see Table 13, supra.]

	Name of dye.	Production, 1919.			Production, 1920.	
		Quantity.	Value.	Price per pound.	Quantity.	Value.
	Total finished coal-tar products	*Pounds.* 82,532,390	$84,385,544	$1.02	*Pounds.* 112,942,227	$112,731,567
	STILBENE DYES.					
9	Direct yellow	440,934	767,674	1.74	348,849	520,538
	AZO DYES.					
32	Buffar Yellow R	31,156	47,964	1.54	74,182	103,476
33	Chrysoidine Y	314,581	326,223	1.04	585,648	569,799
34	Chrysoidine R	220,542	246,977	1.12	186,793	148,421
36	Sudan I	75,868	97,286	1.28	116,624	140,630
37	Croceine Orange	17,274	15,273	.88	96,573	100,158
41	Fast acid fuchsine B	26,699	45,222	1.69	30,678	80,724
48	Alizarin Yellow GG	163,170	116,906	.72	211,580	134,021
58	Alizarin Yellow R	130,424	110,152	.84	83,334	71,294
82	Ponceau 2 R	552,680	439,515	.80	1,286,002	1,024,440
112	Bordeaux B	161,862	146,816	.91	217,466	202,873
134	Metanil Yellow	477,143	787,110	1.65	629,437	1,031,223
145	Orange II	1,133,925	717,199	.63	1,850,341	1,142,245
161	Fast Red A	267,582	280,974	1.05	433,989	452,668
163	Azo rubine	187,264	267,129	1.43	470,949	673,305
168	Amaranth	294,416	877,491	2.98	294,958	431,594
169	Cochineal Red	231,519	305,445	1.32	288,945	363,766
181	Salicine Black U	739,372	923,898	1.25	1,074,248	1,182,698
197	Thiazine Red G	11,886	14,266	1.20	13,988	31,139
202	Palatine chrome red B	28,081	79,928	2.85	67,817	135,142
	All other monoazo dyes	939,935	1,190,753	1.27	933,717	1,408,345
	Total monoazo dyes	8,881,810	11,560,384	1.30	11,916,939	14,671,649
	Disazo dyes.					
217	Agalma Black 10 B	1,877,860	2,757,443	1.47	2,608,884	3,377,007
227	Brilliant Croceine	157,509	379,494	2.41	129,124	287,654
283	Bismark Brown	412,574	417,276	1.01	514,218	481,194
284	Bismark Brown 2 R	631,308	659,332	1.04	484,929	441,867
303	Paper yellow	48,723	61,711	1.27	91,218	109,332
304	Chrysophenine G	86,795	219,215	2.53	247,202	694,392
307	Congo Red	873,734	979,285	1.12	1,502,630	1,296,529
312	Congo Corinth G	137,704	266,770	1.94	242,503	443,166
333	Oxamine Black BHN	485,040	1,321,362	2.72	803,501	1,998,913
337	Benzo Blue 2 B	1,380,335	1,386,291	1.01	1,789,774	1,576,259
340	Benzo Orange R	42,807	37,820	.88	86,210	92,282
342	Chrysamine G	54,279	73,723	1.36	49,342	53,044
343	Diamine Fast Red F	56,864	154,789	2.72	115,865	299,666
344	Diamine Brown	15,959	35,067	2.20	257,872	513,847
363	Benzopurpurine 4 B	288,021	517,706	1.80	617,629	904,660
386	Benzo Blue B X	92,214	162,745	1.76	90,117	125,473
391	Benzo Blue 3 B	182,945	309,066	1.69	136,891	228,464
410	Benzazurine G	150,589	479,460	3.18	237,328	469,965
426	Benzamine pure blue	192,330	378,537	1.97	223,100	541,200
	Total disazo dyes	9,307,768	14,401,615	1.55	12,904,127	18,763,839
	Trisazo dyes.					
462	Direct deep black EW	7,250,007	7,521,343	1.04	7,736,994	7,937,620
474	Oxamine green B	305,854	565,873	1.85	420,138	632,361
475	Oxamine green GX	136,638	291,758	2.14	53,292	63,724
	Total trisazo dyes	8,829,578	10,217,788	1.16	11,657,462	12,990,376
	Tetrakisazo dyes.					
485	Benzo Brown G	83,506	102,536	1.23	109,648	152,427
	Total azo dyes	27,191,371	36,416,702	1.34	36,597,003	46,984,135

—Comparison of production of finished coal-tar products, 1919 and 1920—Con.

Name of dye.	Production, 1919.			Production, 1920.		
	Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
NYLMETHANE DYES.	*Pounds.*			*Pounds.*		
e Green	560,301	$1,827,474	$3.26	654,237	$2,170,580	$3.32
(or fuchsine)	155,830	712,086	4.59	284,285	1,228,646	4.67
Violet	574,426	1,403,179	2.44	666,873	1,436,182	2.39
ue	77,796	494,133	6.35	74,253	437,895	5.90
Blue	16,315	90,613	5.55	98,770	468,295	4.74
tal triphenylmethane	1,761,742	6,494,720	3.68	2,482,169	10,430,336	4.08
ANTHONE DYES.						
	121,393	764,179	6.30	85,489	358,280	4.19
tal Xanthone dyes	190,138	1,235,326	6.54	215,044	1,156,639	5.38
DENZENYL DYES.						
e	271,338	464,870	1.71	183,179	291,980	1.59
Yellow	54,077	142,831	2.66	100,248	237,076	2.36
NE AND THIAZINE DYES.						
Blue B	43,827	164,184	3.75	76,719	237,719	3.10
nine	365,243	1,105,346	3.03	70,169	214,506	3.06
e Blue	405,992	1,410,760	3.02	577,264	1,695,381	2.94
tal oxazine and thiazine	904,755	2,754,677	3.04	786,720	2,330,146	2.96
AZINE DYES.						
	131,042	527,231	4.02	149,629	580,116	3.88
t Gray	28,451	48,544	1.71	31,620	77,373	2.45
(spirit soluble)	436,201	231,233	.53	140,400	170,581	1.21
(spirit soluble)	346,167	245,598	.71	919,242	813,079	.88
(water soluble)	130,704	87,494	.67	168,048	173,622	1.03
e (water soluble)	1,660,149	987,457	.59	2,743,021	1,967,953	.72
SULPHUR DYES.						
Black	14,564,770	4,141,124	.28	16,305,037	4,156,241	.25
Blue	1,622,762	1,797,469	1.11	1,514,814	1,484,731	.98
Brown	805,861	378,129	.42	1,269,731	441,877	.35
Green	247,641	279,349	1.01	177,227	242,674	1.36
Tan	81,905	27,567	.34	93,038	44,873	.47
Yellow	276,460	228,441	.75	408,957	291,588	.71
tal sulphur dyes	17,624,418	6,901,731	.39	20,034,500	6,936,703	.35
HRAQUINONE DYES.						
Brown	40,426	63,674	1.58	42,840	72,901	1.68
AND ITS DERIVATIVES.						
ynthetic	8,863,824	5,233,719	.59	18,178,231	13,497,981	.74
e and indigo extract	1,899,670	1,093,724	.64	1,395,090	1,401,478	1.01
COLOR LAKES.						
es	543,201	391,210	.72	645,647	457,570	.71
akes	74,625	9,812	.13	113,630	10,688	.09
akes	524,030	530,804	1.01	606,618	585,133	.96
kes	466,977	214,697	.46	431,870	228,898	.53
ed	565,316	570,687	1.01	496,600	486,427	.98
lakes	697,699	260,769	.37	740,765	316,122	.43
akes	246,710	92,291	.37	339,275	120,483	.35
d	484,306	148,132	.31	970,589	269,922	.28
es	2,101,527	996,765	.47	4,440,797	2,069,067	.47
akes	865,536	361,904	.42	783,011	318,283	.41
kes	259,378	345,078	1.33	336,969	459,735	1.36
lakes	640,445	238,824	.39	536,122	324,845	.61
ninl-color lakes	7,909,921	4,179,964	.55	10,963,538	5,871,820	.53

TABLE 14.—*Comparison of production of finished coal-tar products; 1919 and 1920.*

Name of dye.	Production, 1919.			Production, 1920.	
	Quantity.	Value.	Price per pound.	Quantity.	Value.
PHOTOGRAPHIC CHEMICALS.	*Pounds.*			*Pounds.*	
Hydroquinone	272,329	$552,087	$2.09	411,019	$907,365
Methyl p-amidophenol sulfate (metol)	59,024	506,434	8.46	28,831	202,917
Total photographic chemicals	335,509	1,059,340	3.16	440,759	1,015,848
MEDICINALS.					
Acetanilide, U. S. P.	918,795	440,066	.48	1,255,140	631,040
Acetylsalicylic acid (aspirin)	1,777,105	4,034,400	2.27	1,708,436	1,472,493
Methyl salicylate	879,833	332,123	.38	603,759	432,423
Phenolsulfonates (calcium, sodium, zinc, etc.)	33,711	16,333	.48	181,516	79,956
Salol	124,034	112,359	.91	281,279	251,146
Sodium salicylate	301,518	169,508	.56	450,764	242,104
Total medicinals	6,777,988	7,883,071	1.16	5,184,989	5,726,776
FLAVORS.					
Saccharin	547,988	1,017,091	1.85	137,315	418,757
Total flavors	610,825	1,318,654	2.16	166,884	527,483
PERFUME MATERIALS.					
Benzyl acetate	17,049	39,137	2.30	33,764	56,791
Methyl anthranilate	695	8,260	11.89	2,351	28,065
Total perfumes	41,419	164,302	3.96	99,740	332,698
Total synthetic phenolic resins	3,094,534	2,311,358	.75	4,659,680	3,416,170

EMPLOYEES AND RATES OF PAY.

Reports were made by 192 of the 213 firms manufacturing c products concerning the number of employees receiving specifie of pay on either December 18, 1920, or on the nearest represen normal date for which this information could be obtained. result of these reports is contained in Tables 15 and 16.

The 21 firms not reporting, in most cases either conducted a ness in which coal-tar products were not the primary artic manufacture, or did not have separately organized departments ing with coal-tar products.

One hundred and ninety-two firms reported a total of employees, a decrease of 2,549 in number from 1919. Chemist technically trained men totaled 2,551, or 11.5 per cent of "all em ees." In 1919 there were 2,605 chemists and technically t men, who made up 10.5 per cent of "all employees." In the for 1919 it was pointed out that the dye and coal-tar ch industry has probably a larger proportion of technically traine than will be found in any other manufacturing industry in the States. Twenty-six per cent of the chemists and technically t men received $50, but under $75 per week; 20.78 per cent re more than $75 per week; 16.9 per cent received $40, but less th per week. Of the men without technical training, 28.34 pe

ved $30, but less than $35 per week; 19.55 per cent received $25, ess than $30 per week; and 17.47 per cent received $35, but less $40 per week.

general, wages in 1920 for both classes of men show considerable ases over those of 1919. Table 16 contains a comparison for the 1919 and 1920 of specified rates of pay of technically trained and men without technical training. Among the technically ed men there was an increase of about 14 per cent in each e four classes receiving between $35 and $75 per week. In the chnical class there was an increase of 11 to 21 per cent in each e three classes receiving between $25 and $40 per week.

TABLE 15.—*Employees and rates of pay in 1920.*

[Dye and Coal-Tar Chemical Industry.]

Wages per week.	Number of employees at each specified wage engaged in manufacturing operations.			Percentage receiving each specified wage.		Percentage receiving each specified wage or more.	
	Chemists and technically trained men.	Men without technical training.	All employees.	Of all chemists and technically trained men.	Of all men without technical training.	Of all chemists and technically trained men.	Of all men without technical training.
0	3	30	33	0.12	0.15	100.00	100.00
under $15	15	303	318	.59	1.54	99.88	99.85
under $20	55	618	673	2.15	3.15	99.29	99.31
under $25	72	2,038	2,110	2.82	10.38	97.14	95.16
under $30	118	3,837	3,955	4.63	19.55	94.32	84.78
under $35	201	5,564	5,765	7.88	28.34	89.69	65.23
under $40	242	3,431	3,673	9.49	17.47	81.81	36.89
under $45	431	1,813	2,244	16.90	9.23	72.32	19.42
under $50	214	1,049	1,263	8.39	5.34	55.42	10.19
under $75	670	907	1,577	26.25	4.62	47.03	4.85
over	530	46	576	20.78	.23	20.78	.23
tal	2,551	19,636	22,187	100.00	100.00	.....	.....

TABLE 16.—*Comparison of employees and rates of pay, 1919 and 1920.*

[Dye and Coal-Tar Chemical Industry.]

Wages per week.	Percentage receiving each specified wage or more.					
	Of all chemists and technically trained men.			Of all men without technical training.		
	1919	1920	Increased percentage.	1919	1920	Increased percentage.
under $15	99.9	99.9	.....	99.5	99.9	0.4
under $20	99.7	99.3	[1] 0.4	97.5	99.3	1.8
under $25	96.1	97.1	1.0	92.2	95.2	3.0
under $30	89.6	94.3	4.7	68.6	84.8	16.2
under $35	80.0	89.7	9.7	44.1	65.2	21.1
under $40	68.0	81.3	13.8	25.9	36.9	11.0
under $45	57.4	72.3	14.9	12.7	19.4	6.7
under $50	40.5	55.4	14.9	6.1	10.2	4.1
under $75	32.1	47.0	14.9	2.6	4.9	2.3
over	12.7	20.8	8.1	.1	.2	.1

[1] ease.

RESEARCH WORK.

Of the 213 firms engaged in the manufacture of dyes and other coal-tar chemicals, 76 had separately organized research laboratories for the solution of technical problems in the manufacture of their products and for the development or discovery of new products. During 1920 the net operating expenses of these laboratories, together with research work done in the laboratories not separately organized for research, was $3,806,798. This includes salaries, apparatus, and materials, after deducting the value of saleable products made in the research laboratories. The figure for 1920 shows a decrease of $467,449 compared with 1919. This may be accounted for in part by the business depression which naturally tended to curtail investigational work. This figure is doubtless an understatement of the real cost of experimental work, since it does not include, in all cases, the cost of research done as a part of manufacturing operations and not shown on the books of the companies as a charge against research.

The total reported cost of research in the coal-tar dye and chemical industry for the four years 1917–1920, was $15,126,739. With the exception of the year 1917, this is net, and does not include the value of saleable products made in experimental departments. In probably no other chemical field has there been so extensive and energetic investigation carried out as in the manufacture of dyes. The achievements of the last three years must be attributed in no small part to the activity and liberal policy of the manufacturers in this field. Extended research is necessary for the development of a self-sustaining and competitive dye industry, and should be continued for the future welfare of the domestic industry.

PART III

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1920 CALENDAR YEAR

PART III.

MPORTED FOR CONSUMPTION IN THE UNITED STATES, 1920, CALENDAR YEAR.

INTRODUCTORY.

n 501 of Title V of the act of September 8, 1916, makes the duties on dyes and other finished coal-tar products after ber 8, 1921, dependent upon whether as much as 60 per value of the consumption of these products is being produced United States. Unfortunately, however, the provisions are r as to whether the domestic consumption is to be considered total consumption of each class of finished products or the ption of individual items within the class. In either case as been a lack of detailed information as to the importation idual dyes, and therefore a census of imports was undertaken Tariff Commission.

the cooperation of the Treasury Department all invoices g dye imports in the calendar year 1920, with the exception of the port of New York, were sent to the Commission for ion. The statistics of dyes imported through the port of ork were obtained by transcribing the necessary information rom the invoices in the files of the Collector of the port of ork. In order to include only the dyes imported for domestic ption and not those which were later exported, only the withdrawals for consumption from warehouse entries were included following tables. These withdrawals for consumption during endar year 1920 were transcribed from entries made as far January 1, 1919, as it was believed that withdrawals during om entries made previous to that date were negligible.

dyes imported were classified according to their chemical ition and tabulated according to the Schultz and Julius (1914 edition). Various dyes were also identified according ion[1] as well, and from other sources of information in the files Tariff Commission. Dyes identified by Norton as a, b, c- under a given Schultz number were included in that number case without special designation, although it is understood ch dyes are not always chemically identical with the original types.

Tariff Commission can not vouch for the accuracy of these cations, as some identifications were supplied by dye experts hers by foreign manufacturers, and there was no opportunity mine samples of the imports. Those dyes which could not be ed by Schultz numbers were classified according to their l of application as follows: acid, basic, direct, lake and spirit , mordant and chrome, sulphur, and vat dyes (including

[1] Thomas H.: "Artificial Dyestuffs Used in the United States," Department of Commerce, Series No. 121.

indigo). A small number of colors not classified either by Schu tables or by method of application are listed by name under the he ing "unidentified and unclassified colors," as the trade or chem name for the dyes was not given in the invoices.

The published values of English dyes include c. i. f. charges, v the exception of a small charge for packing. In the case of S dyes, however, all extra charges are included in every insta The German invoices varied in the methods used, but in most c the extra charges are not included in the invoice values.

The rate of exchange used in converting the foreign invoice v to United States currency was either the rate given on the inv or the exchange value published by the Treasury Department that quarter in which the date of consular certification occurred.

Summary of Imports of Dyes During 1920.

Table 18 shows the quantity and value of each individual imported during the calendar year 1920. The total importatio all coal-tar dyes during 1920 was 3,402,582 pounds valuec $5,763,437, a decrease of about 99,000 pounds from the imports du the fiscal year 1920. This same table also shows the percentag the quantity of each dye according to the country from which it imported. Of the total import of dyes during 1920, 51 per cent 1,748,830 pounds originated in Germany; 34 per cent, or 1,149 pounds came from Switzerland; 6 per cent, or 211,936 pounds, v imported from England, and about 9 per cent, or 292,342 pou came from all other countries, which include Holland, Sweden, It Canada, Japan, and South America. This latter class of 9 per c undoubtedly represents colors reexported in many cases from countries named.

TABLE 17.—*Summary of dyes imported for consumption in the United States durin calendar year 1920, classified by application.*

Class.	Total pounds.	Per
Vats:		
(*a*) Indigo	171,101	
(*b*) Vats (other than indigo)	761,363	
Total	932,464	
Acid	738,405	
Mordants and chromes:		
(*a*) Alizarin	73,252	
(*b*) Mordants and chromes	636,280	
Total	709,532	
Direct	571,581	
Sulphur	229,140	
Basic	192,163	
Spirit soluble and color lakes	17,527	
Unidentified, unclassified	16,920	
Total	3,402,582	

In Table 17 imports of individual dyes have been classified acc ing to application. The "vat dyes other than indigo" constitu the largest class imported during 1920, and accounted for 761, pounds, or 22.37 per cent of the total import. The acid dyes ran

next in importance, with an import of about 733,405 pounds, or 21.55 per cent of the total. The importation of mordant and chrome dyes was only slightly less than the acid dyes, and amounted to 709,482 pounds, or 20.87 per cent of the total import. Importation of direct dyes amounted to 571,581 pounds, which was 16.80 per cent of the total. The imports of the other classes include sulphur dyes, 229,140 pounds, or 6.73 per cent of the total; basic dyes, 192,163 pounds, or 5.64 per cent; indigo, 171,101 pounds, or 5.04 per cent; and spirit soluble and color lake dyes, 17,527 pounds, or 0.51 per cent of the total import.

In the class of "vat dyes other than indigo" the most important was Indanthrene Blue GCD, which amounted to 147,620 pounds, or 19.4 per cent of the total of this class. The dyes of next importance in this group were Indanthrene Violet BB and RR, totaling 124,947 pounds, and Indanthrene Yellow G and R, totaling 75,665 pounds. Other important dyes imported in substantial quantities in this class were Ciba Blue 2B, 35,857 pounds; Indanthrene Golden Orange AR, 35,338 pounds; Helindone Pink, 27,162 pounds; Ciba Scarlet, 25,578 pounds; Hydron Blue, 19,210 pounds; Ciba Violet B, 18,287 pounds; Helindone Violet, 16,882 pounds; and Indanthrene Blue RS, 16,385 pounds.

In the group of mordant and chrome dyes, the most important dye was Anthracene Blue WR, imports of which amounted to 103,913 pounds, or 16.3 per cent of the total of this group. The dye of next importance in this class was Alizarin, imports of which were 73,252 pounds, or 11.5 per cent of the total. Other important dyes in this group imported during 1920 included Alizarin Blue S, 43,679 pounds; Acid Alizarin Black SE, 34,302 pounds; Alizarin Direct Green G, 31,851 pounds; Delphine Blue B, 29,643 pounds, and Alizarin Blue Black, 28,802 pounds.

Of the acid dyes imported during 1920, Wool Green S accounted for 127,764 pounds, or about 17.4 per cent of the total. The two dyes—Patent Blue and Patent Blue A—accounted for 81,221 pounds, or about 11 per cent of the total imports of this group. The dye of next importance in this class was Xylene Light Yellow 2 G & R, which amounted to 77,782 pounds. Other important dyes included in this group were Tartrazine, 47,877 pounds; Quinoline Yellow, 34,440 pounds; Xylene Blue VS, 27,254 pounds, and Acid Violet 4BN, 23,335 pounds.

In the class of imported direct dyes the most important were Zambesi Black, 41,670 pounds; Trisulfon Brown B and MB, 38,616 pounds; Trisulfon Brown GG, 38,411 pounds. The dyes of next importance in this group were Pyrazol Orange G, Benzo Fast Scarlets, Chloramine Brilliant Red 8B, and Heligoland Black. The import of each amounted to about 24,000 pounds, or 4 per cent of the total.

The most important sulphur dyes imported during 1920 were the Thionol Browns, which amounted to 52,135 pounds, or 22.7 per cent of the total. The sulphur dyes of next importance imported include Thionol Yellow, 36,056 pounds; and Thionol Brilliant Green, 26,806 pounds.

In the group of basic dyes, Auramine accounted for 74,414 pounds, or 38.7 per cent of the total import of this group. Rhodamine B, with an import of 24,709 pounds, ranked second in this group, followed by Phosphine, with an import of 19,529 pounds.

Detailed Imports of Dyes During 1920.

Symbols denoting manufacturer.—In the table of imports of dyes under the heading "manufacturer" is shown a symbol for each dye, which refers to the following list of manufacturers in foreign countries.

1. THE SIX LEADING GERMAN COMPANIES.

A.....Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.
B.....Badische Anilin- und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.
By.....Farbenfabriken vorm. Firedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.
C.....Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.
K.....Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branch in Russia.
M.....Farbwerke vorm. Meister Lucius & Brüning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2. THE SEVEN SMALLER GERMAN COMPANIES.

BK.....Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.
CG.....Chemikalienwerk Griesheim G. m. b. H., Griesheim on the Main. Founded 1881.
CJ.....Carl Jäger G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.
GrE.....Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.
L.....Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.
tM.....Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.
WD.....Wülfing, Dahl & Co., A. G. Barmen. Founded 1842.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES.

FA.....Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF.....Niederlandische Farben- und Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897. Branch in Russia.
LG.....Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
P.....Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL.

DH.....Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
G.....Anilinfarben- und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany, and Russia.
I.....Gesellschaft fur chemische Industrie. Founded 1885. Branch in France.
S.....Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES.

ClCo.....The Clayton Aniline Co. (Ltd.), Clayton, near Manchester. Founded 1876.
CR.....Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.
CV.....Colne Vale Chemical Co., Milnsbridge, near Huddersfield.
RHS.....Read Holliday & Sons (Ltd.), Huddersfield. Founded 1830. (Purchased by British Dyes (Ltd.).)
BD.....British Dyes (Ltd.). Founded 1915.
Lev.....Levinstein (Ltd.), Crumpsall Vale, near Manchester. Founded 1864.
Q.....Importations of unknown source, through dealers in colors.

TABLE 18.—*Imports of dyes during the calendar year 1920.*

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
	Total		*Pounds.* 3,402,562	$5,763,437	Germany, 51 per cent; Switzerland, 34 per cent; England, 6 per cent; all others, 9 per cent.
4	Napthol Green		100		Germany, 100 per cent.
	Napthol Green Conc	M			
6	Martius Yellow		26		Do.
	Naphthylamine Yellow	K			
9	Direct Yellow		1,404		England, 100 per cent.
	Afghan Yellow GX	BD			
18	Diphenyl Fast Yellow		1,102		Switzerland, 100 per cent.
	Diphenyl Chlorine Yellow FF	G			
	Diphenyl Chlorine Yellow FF supra.	G			
19	Fast Light Yellow		9,327	14,388.00	Germany, 92 per cent; Switzerland, 8 per cent.
	Erio Flavine SX	G			
	Fast Light Yellow G	By			
	Fast Light Yellow 2G	K			
	Fast Light Yellow 3G	B			
	Fast Light Yellow 3G Conc	By			
	Fast Light Yellow RG	By			
20	Flavazine S	M	1,500		Germany, 100 per cent
22	Xylene Light Yellow		77,782	113,350.89	Switzerland, 100 per cent.
	Xylene Light Yellow	S			
	Xylene Light Yellow 2G	S			
	Xylene Light Yellow R	S			
23	Tartrazine		47,877	62,080.24	Germany, 3 per cent; Switzerland, 97 per cent.
	Tartrazine	S			
	Tartrazine X	B			
	Tartrazine XX	B			
	Tartrazine Conc	S			
	Tartrazine Conc. Pure	S			
28	Pigment Fast Yellow G	M	170		Germany, 100 per cent.
38	Orange GG Powder	C	100		Do.
42	Amido Naphthol Red G		2,028	3,273.51	Switzerland, 100 per cent.
	Erio Floxine 2G Conc	G			
	Erio Floxine 6B Conc	G			
45	Brilliant Red R Paste		1,071		Germany, 100 per cent.
	Brilliant Lake Red Paste	M			
	Brilliant Lake Red R Paste	M			
55	Brilliant Orseille		100		Do.
	Brilliant Orseille C	C			
61	Victoria Violet		2,182	2,794.00	Germany, 9 per cent; Switzerland, 91 per cent.
	Victoria Violet 4BS	S			
	Ethyl Acid Violet 84BXX	B			
63	Azo Acid Blue		4,485	9,152.14	Germany, 2 per cent; Switzerland, 98 per cent.
	Azo Acid Blue B	S			
	Azo Acid Blue 6B	By			
64	Lanafuchsine		674	65.34	Germany, 100 per cent.
	Lanafuchsine 6B	C			
	Lanafuchsine 8B	C			
65	Azo Corallin L		249		Do.
	Azo Crimson L	By			
66	Amido Napthol 6B		1,299	1,395.62	Do.
	Amido Napthol Red BB	M			
	Brilliant Acid Carmine 6B	GE			
73	Helio Fast Red		1,001		Do.
	Helio Fast Red RL Powder	By			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin; centage of quant
			Quantity.	Invoice value.	
			Pounds.		
74	Tannin Orange		349		Germany, 100 pe
	Tannin Orange R	C			
	Tannin Orange R Powder	C			
88	Acid Anthracene Brown		1,400		Do.
	Acid Anthracene Brown	By			
	Acid Anthracene Brown RH Ex	By			
96	Chrome Fast Yellow 2G		500		Switzerland, 1 cent.
	Chrome Fast Yellow G	I			
100	Eosamine B	A	1,600		Germany, 100 pe
117	Erica 2GN	A	337		Do.
118	Geranine		527		Do.
	Geranine G	By			
	Brilliant Geranine B	By			
121	Erica B		2,393		Do.
	Erica B	A			
	Erica BN	A			
122	Erica G		1,142		Do.
	Erica GN	A			
125	Diazine Black	K	701		Do.
132	Lake Red P Paste	M	1,750		Do.
139	Orange IV	G	608		Switzerland, 10 cent.
140	Curcumeine		5,225	$4,404.51	Germany, 12 per Switzerland, cent.
	Curcumeine GG Conc	B			
	Jasmine High Conc	G			
141	Azo Yellow		4,818	4,871.22	Germany, 2 per Switzerland, cent.
	Azo Yellow I	I			
	Helianthine G	G			
	Indian Yellow G	C			
144	Naphthol Orange	BK	1,323		Germany, 100 pe
146	Azo Fuchsine G		3,694	1,052.19	Do.
	Azo Fuchsine G	By			
	Azo Fuchsine 4G	K			
	Azo Fuchsine 4G ex	By			
151	Orange R		20		Do.
	Orange RX	By			
152	Lithol Rubine B		2,983		Do.
	Lithol Rubine BN Powder	B			
	Lithol Rubine G Powder	B			
153	Lake Red C Paste		4,105	5,968.88	Do.
	Lake Red Paste	M			
	Lake Red Lumps	M			
	Lake Red Powder	GrE			
154	Palatine Chrome Brown		845		Do.
	Palatine Chrome Brown RX	B			
155	Acid Alizarin Garnet		201		Do.
	Acid Alizarin Garnet R	M			
158	Chrome Brown RR		2,183		Switzerland, 10 cent.
	Chrome Brown RVV	G			
159	Acid Alizarin Black		439		Germany, 100 pe
	Acid Alizarin Black R	M			
	Acid Alizarin Black R Extra	M			
163	Azo Rubine		1,102		Switzerland, 10 cent.
	Azo Rubine S	G			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
164	Azo Chrome Blue B		6,290	$4,147.73	Germany, 100 per cent.
	Diamond Blue R	By			
	Chromotrope F4B	M			
167	Croceine Scarlet 3BX	By	651		Do.
168	Azorubine	S	110		Switzerland, 100 per cent.
176	Scarlet 2R		1,653		Germany, 100 per cent.
	Scarlet 4R ex conc. 145 per cent	BK			
177	Mordant yellow		1,389	187.60	Do.
	Mordant Yellow O	M			
	Anthracene Yellow C Paste	C			
	Anthracene Yellow C Powder	C			
180	Eriochrome Blue Black		20,371		Switzerland, 100 per cent.
	Eriochrome Blue Black BC	G			
182	Brilliant Sulphon Red		4,740		Do.
	Brilliant Sulphon Red 10B	S			
	Fast Sulphon Violet 5BS	S			
183	Eriochrome Black T	G	2,624		Do.
184	Eriochrome Black A	G	14,262		Do.
185	Anthracene Chrome Black		2,339		Germany, 100 per cent.
	Anthracene Chrome Black 5B	C			
	Anthracene Chrome Black F	C			
	Anthracene Chrome Black FF ex	C			
191	Pyramine Yellow R		100		Do.
	Pyramine Yellow RX	B			
198	Thiazol Yellow		11,182	14,528.67	Switzerland, 64 per cent; England, 36 per cent.
	Thiazol Yellow G. Conc	S			
	Thiazol Yellow GR	BD			
	Mimosa Z Conc	G			
199	Cotton Yellow		125		Germany, 100 per cent.
	Cotton Yellow R	B			
202	Acid Alizarin Red		1,342		Do.
	Acid Alizarin Red B	M			
	Pigment Scarlet 3B	M			
211	Resorcin Brown		2,484	2,465.74	Germany, 65 per cent; Switzerland, 35 per cent.
	Resorcin Brown Conc. 150 per cent	BK			
	Resorcin Brown F	K			
	Resorcin Brown G	G			
212	Acid Brown RN	G	485		Switzerland, 100 per cent.
217	Naphthol Blue Black		340		Germany, 100 per cent.
	Naphthol Blue Black 6B	BK			
220	Buffalo Black PY		200		Do.
	Wool Black GRF	A			
221	Anthracene Acid Brown		225		Do.
	Anthracene Acid Brown R	C			
222	Janus Yellow		758		Do.
	Janus Yellow G	M			
225	Croceine AZ	C	100		Do.
227	Cotton Scarlet		49		Do.
	Cotton Scarlet ex	B			
229	Azo Acid Violet		11		Do.
	Azo Acid Violet A2B	By			
231	Cloth Red 3B		84		Do.
	Cloth Red 3B ex	By			
	Cloth Red 3B ex	M			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity
			Pounds.		
240	Janus Red B		176		Germany, 100 per c
	Janus Red B	M			
241	Neutral Gray		3,472	$3,124.60	Do.
	Neutral Gray G	A			
	Diamine Gray G	C			
251	Croceine Scarlet O		100		Do.
	Croceine Scarlet OO	K			
255	Ponceau 6 RB		154		Do.
	Croceine Scarlet 7B	By			
257	Sulphocyanine		18,327	25,336.18	Germany, 3 per c England, 97 per c
	Sulphocyanine G ex	M			
	Sulphocyanine 5R ex	B			
	Coomassie Navy Blue 2RNX	BD			
264	Fast Sulphon Black		2,204		Switzerland, 100 cent.
	Fast Sulphon Black F	S			
266	Naphthylamine Black		1,687		Germany, 100 per c
	Naphthylamine Black 8	C			
269	Acid Black		1,500		Do.
	Blue Black Solide O	M			
272	Brilliant Black		50		Do.
	Brilliant Black BX	B			
273	Diaminogene Blue		5,936	10,022.08	Do.
	Diaminogene Blue BB	C			
	Diaminogene Blue NA	C			
	Diazanil BB	M			
274	Diaminogene		18,120	14,714.69	Do.
	Diaminogene B	C			
	Diaminogene extra	C			
	Diazo Indigo Blue 2RL	By			
	Diazo Indigo Blue 3RL	By			
	Zambesi Pure Blue 4B	A			
275	Diamond Black		2,226		Switzerland, 100 cent.
	Chrome Fast Black	G			
276	Diamond Green		4,061		Germany, 100 per c
	Diamond Green SS	By			
	Sulfeine Dark Green CS	K			
279	Benzo Fast Scarlet		24,153	29,423.47	Germany, 96 per c Switzerland, 4 cent.
	Benzo Fast Scarlet 4BS	By			
	Benzo Fast Scarlet 5BS	By			
	Benzo Fast Scarlet 6BSS	By			
	Benzo Fast Scarlet 8 BS	By			
	Benzo Fast Scarlet 8BSN	By			
	Benzo Fast Scarlet 4BA	By			
	Benzo Fast Scarlet GS	K			
	Direct Fast Scarlet 8E	I			
288	Acid Alizarin Black SE Paste	M	34,302		Germany, 100 per
293	Milling Red		200		Do.
	Milling Red 4BA	A			
294	Fast Mordant Yellow		887	205.26	Do.
	Fast Mordant Yellow G	B			
	Anthracene Yellow C	C			
	Anthracene Yellow C Powder	C			
296	Cotton Yellow		4,651	8,050.41	Do.
	Cotton Yellow G	B			
	Cotton Yellow GI	B			
	Cotton Yellow GI Fine Powder	B			
	Benzo Fast Yellow 5GL	By			
	Benzo Fast Yellow 4GL	By			
	Benzo Fast Yellow RL	By			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Benzo Fast Pink 2BL	By	1,226		Germany, 100 per cent.
Brilliant Yellow	By	126		Do.
Pyramine Orange 3G	B	396		Do.
Congorubine		2,601		Germany, 58 per cent; Switzerland, 42 per cent.
Congorubine Z	BK			
Congorubine	G			
Congo Orange G	By	75		Germany, 100 per cent.
Diamine Scarlet		10,565	$14,250.83	Germany, 37 per cent; Switzerland, 50 per cent; all other, 13 per cent.
Diamine Scarlet B	C			
Diamine Scarlet 3B	C			
Diamine Scarlet BS	C			
Chloramine Red 3B	S			
Benzo Scarlet	By			
Diamine Blue RW	C			
Heliotrope 2B	A	60		Germany, 100 per cent.
Trisulphon Violet B		7,927		Switzerland, 100 per cent.
Trisulphon Violet B	S			
Trisulphon Violet	S			
Oxamine Violet		732	254.51	Germany, 100 per cent.
Oxamine Violet	B			
Benzo Violet R	By			
Benzo Violet RL ex	B			
Zambesi Brown		1,104		Do.
Zambesi Brown G	A			
Zambesi Brown 2G	A			
Zambesi Brown 4R	A			
Benzo Fast Red		3,799		Do.
Benzo Fast Red 8BL	By			
Benzo Fast Red 9BL	By			
Diamine Black BH Conc	S	5,512		Switzerland, 100 per cent.
Naphthamine Blue		400		Germany, 100 per cent.
Naphthamine Blue 2B	K			
Naphthamine Blue 3B	K			
Chrysamine		9,810		Switzerland, 100 per cent.
Chrysamine K	S			
Diamine Fast Red		4,040	7,295.11	Germany, 32 per cent; Switzerland, 68 per cent.
Diamine Fast Red 8BL	C			
Direct Fast Red F	S			
Diphenyl Fast Red B supra	G			
Chloramine Fast Red F	S			
Oxamine Red		848		Germany, 100 per cent.
Oxamine Red	B			
Oxamine Red 3BX	B			
Diamine Brown B	C	24		Do.
Anthracene Red	By	104		Do.
Dianol Red 2B		17,632		England, 100 per cent.
Dianol Orange Brown X	BD			
Dianol Orange Brown X 200 per cent.	BD			
Diphenyl Red		3,704		Germany, 43 per cent; Switzerland, 57 per cent.
Diphenyl Red SC	G			
Toluylene Red	GrE			
Pyramine Orange R	B	7,821		Germany, 100 per cent.

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin, with percentage of quantity
			Quantity.	Invoice value.	
			Pounds.		
363	Benzopurpurine 4B		3,492	$2,462.24	Germany, 20 p
	Benzopurpurine	G			Switzerland,
	Cotton Fast Red 4BX	B			cent.
	Cotton Fast Red 4BSP	B			
	Cotton Fast Red 4BS	B			
364	Diazo Brilliant Black		4,743		Germany, 100 p
	Diazo Brilliant Black B	By			
366	Delta purpurine 5B		1,896		Germany, 42 p
	Delta purpurine 5B	G			Switzerland,
	Delta purpurine 5B conc	BK			cent.
370	Brilliant Congo R	By	11,129		Germany, 100 p
373	Congo Orange R	By	254		Do.
	Congo Orange R	By			
386	Benzo Blue BX		4,520		Switzerland,
	Chloramine Blue BXR	S			cent.
391	Diamine Blue 3B	C	1,124		
392	Toluylene Orange		273		Germany, 100 p
	Toluylene Fast Orange GL	By			
	Toluylene Fast Orange GL	M			
400	Acid anthracene Red		2,336		Do.
	Acid Anthracene Red G	By			
	Acid Anthracene Red 3B	By			
	Milling Scarlet 4R conc	M			
404	Diamine Yellow N		313		Do.
	Diamine Yellow N	C			
	Diamine Yellow N powder	C			
405	Benzopurpurine 10B	G	2,205		Switzerland,
410	Benzoin Blue RH conc, 300 per cent	BK	287		cent. Germany, 100 p
411	Benzo Azurine 3G		201		Do.
	Benzo Azurine 3G	By			
416	Brilliant Azurine 5G		1,563	2,680.87	Do.
	Brilliant Azurine 5G	By			
	Brilliant Azurine 5G conc	K			
	Brilliant Azurine 5G conc, 30 per cent.	By			
418	Diamine Brilliant Blue G		51		Do.
	Diamine Brilliant Blue G	C			
419	Chicago Blue RW		351		Do.
	Chicago Blue RW	A			
421	Oxamine Blue		13		Do.
	Oxamine Blue 3RXX	B			
424	Chicago blue 6B		7,480	37,945.94	Germany, 54 p
	Chicago Blue 6B	A			Switzerland,
	Oxamine Pure Blue 6B	B			cent.
	Brilliant Benzo Blue 6B	By			
	Diamine Sky Blue FF	C			
	Direct Sky Blue Gr. Shade 250 per cent.				
426	Diamine Pure Blue		662		Switzerland,
	Chloramine Sky Blue A conc, pure	S			cent.
	Chloramine Sky Blue A conc	S			
428	Direct Blue B		7,055	2,839.60	Do.
	Direct Blue 4GN	G			
	Direct Blue 4GN 250 per cent	G			
	Direct Blue RW	G			
432	Diamine Cutch	C	49		Germany, 100 p

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schedule A.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
438	Columbia Black		23,350		Switzerland, 100 per cent.
	Heligoland Black FFN ex	G			
	Heligoland Black BH, 100 per cent.	G			
449	Trisulphon Brown		38,616	$46,368.00	Do.
	Trisulphon Brown B	S			
	Trisulphon Brown MB	S			
	Trisulphon Brown MB conc	S			
451	Benzo Fast Blue		723		Germany, 100 per cent.
	Benzo Fast Blue R	By			
456	Benzo Fast Blue		1,821	4,206.65	Do.
	Benzo Fast Blue B	By			
	Congo Fast Blue B	A			
	Benzo Fast Blue 4GL	By			
457	Trisulphon Brown GG		38,411	52,212.99	Switzerland, 100 per cent.
	Trisulphon Brown GG	S			
	Trisulphon Brown GG conc	S			
	Trisulphon Brown 2G	S			
467	Diphenyl Green G		2,205		Switzerland, 100 per cent.
	Diphenyl Green KGW supra 288	G			
469	Chloramine Black		1,763		Do.
	Chloramine Black ex	S			
471	Chloramine Blue 3G		882		Do.
	Chloramine Blue 3G	S			
473	Diamine Black HW		342		Do.
	Chloramine Black HW	S			
	Chloramine Black ex conc	S			
475	Oxamine Green C		1,332	1,774.16	Germany, 5 per cent; Switzerland, 95 per cent.
	Oxamine lt. Green GX	B			
	Direct Green G	S			
	Chloramine Green G	S			
477	Congo Brown		443		Germany, 100 per cent.
	Naphthamine Brown D3G	K			
	Naphthamine Brown 3G	K			
478	Columbia Green		7,555		Switzerland, 100 per cent.
	Direct Green B	S			
485	Benzo Brown G		2,286	2,415.83	Germany, 100 per cent.
	Benzo Brown G	By			
	Benzo Brown D3G ex	By			
	Dianol Brown D3G ex	By			
493	Auramine		74,414	170,055.06	Germany, 8 per cent; Switzerland, 88 per cent; England, 2 per cent; all other 2 per cent.
	Auramine O	S			
	Auramine O	I			
	Auramine OO	B			
	Auramine OO ex	K			
	Auramine OO D	B			
	Auramine O conc	Q			
	Auramine II	By			
495	Setoglaucine		1,102		Switzerland, 100 per cent.
	Setoglaucine	G			
498	Turquoise Blue		1,407	4,269.28	Germany, 90 per cent; all other 10 per cent.
	Turquoise Blue	Q			
	Turquoise Blue G	By			
	Turquoise Blue BB	By			
499	Brilliant Green		25		Germany, 100 per cent.
	Diamond Green GX	B			
500	Setocyanine		1,102		Switzerland, 100 per cent.
	Setopaline conc	G			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of c centage of q
			Pounds.		
502	Guinea Green		278		Germany, 1(
	Acid Green B	C			
503	Neptune Green		10,940	$25,021.31	Germany, 5
	Neptune Green SGX	B			Switzerlan
	Brilliant Acid Green 6B conc	By			cent.
	Brilliant Milling Green B	C			
	Light Green A ex conc	tM			
	Erioviridine B supra	G			
	Benzyl Green B	I			
	Guinea Fast Green B	A			
505	Light Green Yellowish		7,490	12,168.75	Germany, 9
	Light Green SF Yellowish	B			all other 1
	Light Green SF Yellowish	Q			
	Light Green SF Yellowish X	B			
	Light Green 2GM conc	tM			
	Acid Green GG ex	By			
	Acid Green GG ex conc	C			
	Acid Green conc	M			
	Acid Green B	C			
506	Erioglaucine		6,160	20,314.87	Switzerland,
	Erioglaucine	I			cent.
	Erioglaucine super	G			
	Erioglaucine EP	G			
507	Xylene Blue VS		27,254		Do.
	Xylene Blue VS	S			
508	Xylene Blue AS		5,573		Do.
	Xylene Blue AS	S			
514	Red Violet	tM	750		Germany, 10
516	Crystal Violet		2,919		Germany, 5
	Crystal Violet Powder	Q			Switzerlan
	Crystal Violet Extra	B			cent; all o
	Violet Crystals	S			cent.
517	Benzyl Violet		3,313	8,462.93	Switzerland,
	Benzyl Violet 5BN	I			cent.
	Methyl Violet 5B	DH			
521	Aniline Blue		723	2,275.82	Germany, 97
	Opal Blue, Blue Shade	M			all other 3
	Night Blue	Q			
522	Victoria Blue 4R		152		Germany, 10
	Victoria Blue 4R	B			
	Victoria Blue 4R	A			
	Victoria Blue 4R highly conc	B			
523	Fast Light Green		10,461	16,746.82	Do.
	Fast Green ex	By			
	Fast Green ex Bluish	By			
	Fast Light Green	By			
524	Acid Magenta		651	277.58	Do.
	Acid Magenta G 260 per cent	BK			
	Acid Fuchsine O	M			
	Fuchsine S	B			
527	Acid Violet 4BN		23,335	51,549.94	Germany, 31
	Acid Violet 4BN	M			Switzerlan
	Acid Violet 4BNs	S			cent.
	Acid Violet 7BN	M			
	Acid Violet BW	By			
	Acid Violet 8B ex	M			
528	Fast Acid Violet 10B		10,086	16,416.46	Germany, 67
	Fast Acid Violet 10B	By			Switzerlan
	Fast Acid Violet 10B Conc	By			cent.
	Keton Fast Violet 10B	I			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Ault's No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
530	Acid Violet		3,925	$11,723.25	Germany, 100 per cent.
	Guinea Violet 4B	A			
	Acid Violet 6BNOO	B			
	Acid Violet 6BNO	B			
	Acid Violet 4BLO	B			
	Acid Violet 4BLOOF	B			
	Acid Violet 4BC Conc	B			
	Formyl Violet S4B	C			
531	Eriocyanine		8,223		Switzerland, 100 per cent.
	Eriocyanine A	G			
534	Acid Violet		51		Germany, 100 per cent.
	Acid Violet 7B Conc	B			
535	Methyl Alkali Blue		29		Do.
	Alkali Blue 6B	C			
536	Alkali Blue		6,778	8,682.36	Germany, 93 per cent; all other, 7 per cent.
	Alkali Blue HHRRooo	GrE			
	Alkali Blue 3B	C			
	Alkali Blue 4B	A			
	Alkali Blue 6B	C			
	Alkali Blue 4BE	Q			
	Alkali Blue R	C			
	Alkali Blue 2R	M			
	Alkali Blue No. 4	GrE			
537	Methyl Blue for Silk		2,395	9,109.95	Germany, 1 per cent; Switzerland, 99 per cent.
	Methyl Lyons Blue	G			
	Methyl Lyons Blue 410	G			
	Methyl Silk Blue (new)	G			
	Methyl Silk Blue	G			
	Methyl Silk Blue (new) 706	G			
	Blue, Pure	M			
539	Soluble Blue		1,387	2,287.09	Germany, 91 per cent; England, 9 per cent.
	Soluble Blue 2R	BD			
	Pure Blue RT	Bk			
	Silk Blue BT5Boo	GrE			
543	Patent Blue		36,420	71,058.13	Germany, 99 per cent; all other, 1 per cent.
	Patent Blue	Q			
	Patent Blue B	M			
	Patent Blue B Conc	M			
	Neptune Blue BGX	B			
	Patent Marine Blue LE	M			
	Patent Blue L	M			
	Patent Blue L Conc	M			
	Patent Blue N	M			
	Patent Blue V	M			
	Patent Blue V Conc	M			
	Patent Blue J3A	M			
	Tetracynole ex	C			
544	Cyanine B		24		Germany, 100 per cent.
	Cyanine B	M			
545	Patent Blue A		44,801	101,123.54	Germany, 97 per cent; all other, 3 per cent.
	Patent Blue A	GrE			
	Patent Blue A (new)	M			
	Patent Blue A	M			
	Patent Blue A	Q			
	Brilliant Patent Blue AL	M			
	Brilliant Patent Blue AL Conc	M			
	Neptune Blue BXX	B			
	Brilliant Acid Blue FF Conc	By			
	Brilliant Acid Blue FF Conc., 60 per cent.	By			
	Brilliant Acid Blue CB	By			
546	Cyanole ex		7,954		Germany, 100 per cent.
	Cyanole ex	C			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin centage of quanti
			Pounds.		
548	**Acid Violet 6BN**		5,582		Germany, 2 per Switzerland, 9 cent; all other, cent.
	Acid Violet 6BN	I			
	Acid Violet 6BNO	B			
551	Eriochrome Azurol B		7,275		Switzerland, 100 cent.
	Eriochrome Azurol BX	G			
553	Eriochrome Cyanine RC		2,205		Do.
	Eriochrome Cyanine RC	G			
554	Chrome Azurol S		551		Do.
	Chrome Azurol SXT	G			
555	Aurine		336		
	Aurine	Q			
558	New Victoria Blue B		97		Germany, 100 per
	New Victoria Blue B	By			
559	Victoria Blue B		11,782	$33,754.11	Germany, 27 per Switzerland, 7 cent.
	Victoria Blue	M			
	Victoria Blue B	G			
	Victoria Blue B	S			
	Victoria Blue B	I			
	Victoria Blue B	D & H			
	Victoria Blue B Base	B			
	Victoria Blue B Base	I			
	Victoria Pure Blue BO	B			
	Victoria Blue Double Conc	M			
	Victoria Blue Highly Conc	B			
560	Night Blue	B	11		Germany, 100 per
562	Fast Acid Blue		6,478	19,686.36	Do.
	Fast Acid Blue B	By			
	Intensive Blue B	By			
	Intensive Blue B	K			
	Wool Blue N ex	By			
	Wool Blue SR	By			
	Brilliant Wool Blue FFR	By			
	Wool Blue SR ex	By			
563	New Patent Blue B		1,814		Do.
	New Patent Blue B	By			
564	Naphthalene Green		9,291	40,040.82	Germany, 21 per Switzerland, 7 cent.
	Naphthalene Green V	M			
	Naphthalene Green Conc. ex	M			
	Naphthalene Green V Conc	M			
	Naphthalene Green Conc	M			
	Erio Green B	G			
	Erio Green B Conc	G			
	Erio Green B Supra	G			
	Erio Green B Supra 657	G			
565	Acid Blue B		1,852	3,748.06	Germany, 100 per
	Wool blue				
	Wool Blue 2BA	A			
	Wool Blue 5B	A			
	Wool Blue G Extra	A			
566	Wool Green S		127,764	283,196.16	Germany, 20 per Switzerland, 7 cent; all other, cent.
	Wool Green S	S			
	Wool Green S Conc	S			
	Wool Green S Conc. 250 per cent	I			
	Wool Green S Extra Conc. new	B			
	Wool Green S highly Conc	B			
	Wool Green BS	By			
	Wool Green BS Conc	By			
	Wool Green SC	G			
	Cyanol Green B	C			
570	Rhodamine S		273		Germany, 100 per
	Rhodamine S Extra	B			
	Rhodamine SP	B			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schedule No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (per centage of quantity).
			Pounds.		
571	Rhodamine 6G		8,574	$59,062.90	Germany, 57 per cent; Switzerland, 36 per cent; all other, 7 per cent.
	Rhodamine 6G	I			
	Rhodamine 6G	M			
	Rhodamine 6G Ex	I			
	Rhodamine 6G Ex. Conc	S			
	Rhodamine 6G Ex. Conc	I			
	Rhodamine 6G Ex. Pure	B			
	Rhodamine 6G Single	Q			
	Rhodamine 6GB	B			
	Rhodamine 6GD	M			
	Rhodamine 6GDN	B			
	Rhodamine 6GDN. Ex	B			
	Rhodamine 6GF	B			
	Rhodamine 6GN Ex	B			
572	Rhodamine G		517	594.74	Germany, 100 per cent.
	Rhodamine G	B			
	Rhodamine G	M			
	Rhodamine G Extra	B			
	Rhodamine GK	B			
	Rhodamine GK	M			
573	Rhodamine B		24,709	92,067.43	Germany, 44 per cent; Switzerland, 50 per cent; all other, 6 per cent.
	Rhodamine B	B			
	Rhodamine B Ex	B			
	Rhodamine B	M			
	Rhodamine B Base	M			
	Rhodamine B	By			
	Rhodamine B Ex	By			
	Rhodamine B Ex	S			
	Rhodamine B Ex	I			
	Rhodamine B Ex	M			
	Rhodamine B Special	M			
	Rhodamine BE	M			
	Rhodamine BFD	M			
	Rhodamine BN	M			
	Rhodamine BSP	M			
	Rhodamine O	M			
576	Rhodamine 3G		855	227.85	Germany, 48 per cent; all other, 52 per cent.
	Rhodamine 3G	B			
	Rhodamine 3G Ex	B			
	Rhodamine 3GF	B			
	Rhodamine 3GF Ex	B			
	Irisamine G	C			
	Irisamine G Ex	S			
580	Fast Acid Violet B		2,907	8,485.93	Germany, 100 per cent.
	Fast Acid Violet B	M			
	Fast Acid Violet R	GrE			
	Fast Acid Violet R	M			
	Fast Acid Violet RGE	M			
	Fast Acid Violet RL	M			
581	Fast Acid Phloxine A		5,234		Do.
	Fast Acid Phloxine A	M			
	Fast Acid Eosine G ex	M			
582	Fast Acid Violet A2R		2,679	16,329.42	Do.
	Fast Acid Violet A2R	M			
	Violamine R	M			
	Violamine R conc	M			
583	Violamine G		141		Do.
	Violamine G	M			
584	Fast Acid Blue R		130		Do.
	Fast Acid Blue R	M			
585	Uramine		10		Do.
	Uramine	M			
586	Chrysoline		1,402		Switzerland, 100 per cent.
	Chrysoline	G			
587	Eosine		296		Germany, 100 per cent.
	Eosine A (free from sand)	B			
	Eosine S	B			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origi centage of quan
			Pounds.		
590	Acid Eosine		1,132		Germany, 100 p
	Acid Eosine L New	B			
	Fast Eosine L Paste	B			
599	Galleine		5,075	$2,192.96	Germany, 6 p
	Galleine	B			Switzerland,
	Galleine JRG Paste	G			cent.
	Galleine W Powder	M			
601	Coerulein S		9,392	14,754.31	Germany, 70 p
	Coerulein S Powder	B			Switzerland,
	Coerulein I	B			cent; Englan
	Coerulein I Paste	B			cent; all othe
	Coerulein MS Powder	DH			cent.
	Coerulein SL Powder	BD			
603	Acridine Orange		1,925	5,063.56	Germany, 43 p
	Acridine Orange	DH			Switzerland,
	Euchrysine 3RX	B			cent.
	Rhoduline Orange N	By			
606	Phosphine		19,529	85,158.75	Germany, 21 p
	Phosphine extra	M			Switzerland,
	Phosphine 3R	A			cent; all othe
	Brilliant Phosphine 5G 300 per cent.	I			cent.
	Coriphosphine OX extra	By			
	Para Phosphine G	C			
	Para Phosphine A extra	Q			
	Patent Phosphine G 300 per cent Paste.	I			
	Patent Phosphine G conc. 300 per cent.	I			
	Patent Phosphine GG 300 per cent	I			
	Patent Phosphine GG conc	I			
	Patent Phosphine M 300 per cent	I			
	Patent Phosphine M conc. 300 per cent.	I			
	Patent Phosphine R	I			
	Saba Phosphine G	S			
	Saba Phosphine GG	S			
608	Euchrysine		2,432	3,868.55	Germany, 100 p
	Euchrysine GRNTN	B			
	Euchrysine RRD	B			
	Euchrysine RT	B			
609	Homophosphine G		1,749	3,255.00	Do.
	Diamond Phosphine R	C			
	Flavaphosphine 4G conc	M			
	Corioflavine G	GrE			
612	Quinoline Yellow Spirit Soluble		205		Do.
	Quinoline Yellow P extra conc	B			
613	Quinoline Yellow		34,440	59,039.81	Germany, 28 p
	Quinoline Yellow	By			Switzerland,
	Quinoline Yellow	G			cent; all othe
	Quinoline Yellow	I			cent.
	Quinoline Yellow	S			
	Quinoline Yellow, extra	B			
	Quinoline Yellow, extra	By			
	Quinoline Yellow N extra	By			
	Quinoline Yellow O	A			
	Quinoline Yellow O	M			
	Quinoline Yellow WN	Q			
615	Thioflavine S	C	675		Germany, 100 p
616	Primuline		441		Switzerland,
	Polychromine AC	G			cent.
617	Columbia Yellow		4,810	3,591.63	Germany, 100 p
	Chloramine Yellow GG	By			
	Chloramine Yellow GG	K			
	Diamine Fast Yellow 3G	C			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
		Pounds.		
Thioflavine T		5,807	$9,848.08	Germany, 75 per cent; Switzerland, 13 per cent; all other, 12 per cent.
Thioflavine T	Q			
Thioflavine T	C			
Thioflavine T	K			
Thioflavine T	S			
Thioflavine T 140 per cent	C			
Rhoduline Yellow 6 G	By			
Delphine Blue B		29,643		Switzerland, 100 per cent.
Brilliant Delphine Blue B. S	S			
Violet Moderne N		5,688	14,117.19	Do.
Violet Moderne	DH			
Violet Moderne powder	DH			
Violet Moderne N	DH			
Gallocyanine		12,414		Do.
Gallocyanine paste	S			
Brilliant Chrome Blue P	S			
Gallocyanine M. S		22		Do.
Chromocyanine		1,287		Do.
Chromocyanine B paste	DH			
Indalizarin R		551		Do.
Indalizarin I paste	DH			
Ultra Violet M. O		1,933		Do.
Ultra Violet M. O	S			
Prune Pure		4,418		Do.
Prune Pure	S			
Gallamine Blue		16,446		Do.
Gallamine Blue extra paste	G			
Soluble Blue 2A	BD	100		England, 100 per cent.
Coreine RR		44		Switzerland, 100 per cent.
Coreine RR	DH			
Phenocyanine TC		4,740		Do.
Phenocyanine VS paste	DH			
Phenocyanine R paste	DH			
Phenocyanine TV				Do.
Phenocyanine TV powder	DH	1,543		Do.
Cotton Blue		5,240		Do.
Meldola Blue 3R conc	S			
Nile Blue		1,241		Germany, 100 per cent.
Nile Blue A	B			
Nile Blue B	B			
Fast Black		2,883	14,874.25	Do.
Gallophenine P	By			
Gallophenine P	K			
Methylene Blue		2,053	6,983.44	Germany, 11 per cent; Switzerland, 73 per cent; all other, 16 per cent.
Methylene Blue	I			
Methylene Blue B. B	S			
Methylene Blue B. B. (zinc free)	S			
Methylene S. Z. O	DH			
Methylene Blue medicinal	I			
Methylene Blue medicinal	Q			
Methylene Green		1,047	2,234.92	Switzerland, 100 per cent.
Methylene Green G conc	S			
Methylene Green G extra	S			
Methylene Green W	G			
Thionine Blue		2,000		Germany, 100 per cent.
Thionine Blue GO	M			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin, with percentage of quantity.
			Quantity.	Invoice value.	
			Pounds.		
663	New Methylene Blue		513	$433.69	Germany, 14 per cent; all other, 86 per cent.
	New Methylene Blue N	Q			
	New Methylene Blue NNX	B			
667	Indochromine		3,214	7,485.05	Switzerland, 1[illegible] cent.
	Indochromine RR	S			
	Indochromine T	S			
	Indochromine T conc. double	S			
671	Induline Scarlet		154		Germany, 100 per cent.
	Induline Scarlet	B			
672	Azo Carmine		196		Do.
	Azo Carmine GX	B			
	Azo Carmine GX extra	B			
673	Azo Carmine B		649	435.19	Do.
	Azo Carmine BX	B			
	Rosinduline 2B bluish	K			
674	Rosinduline		201		Do.
	Rosinduline 2G	K			
675	Rosinduline G		40		Do.
	Rosinduline GXF	K			
680	Methylene Violet		33		Switzerland, 1[illegible] cent.
	Methylene Violet B	DH			
681	New Fast Gray		9		Germany, 100 per cent.
	Methylene Gray ND	M			
684	Rhoduline Violet		35		Do.
	Brilliant Rhoduline Red B	By			
685	Tannin Heliotrope		249		Do.
	Tanning Heliotrope	C			
687	Rosolane OTR		1,083	10,966.08	Do.
	Rosolane B	M			
	Rosolane O	M			
	Methylene Heliotrope O	M			
	Methylene Heliotrope extra strong	M			
688	Rosolane		3		Do.
	Rosolane extra strong	M			
690	Metaphenylene Blue R		3,124	4,509.07	Do.
	Metaphenylene Blue R	C			
	Diphene Blue R	A			
695	Paraphenylene violet		337		Do.
699	Indocyanine B	A	500		Do.
700	Nigrosine (water soluble)		501		Do.
	Nigrosine T	B			
705	Indamine 6R		9,681	7,506.28	Do.
	Indocyanine				
	Indocyanine B	A			
	Acid Cyanine B	A			
709	Pyrogene Green		2,603		Switzerland, 1[illegible] cent.
	Pyrogene Green 3G	I			
712	Kryogene Yellow		1,543		Do.
	Sulphur Yellow G	S			
720	Sulphur Black		662		
	Sulphur Black Extra L4	Q			
726	Pyrogene Direct Blue		2,498		Do.
	Pyrogene Direct Blue RL	I			
734	Pyrogene Yellow		2,701		Do.
	Pyrogene Yellow O	I			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
746	Thional Green		14,370		Switzerland, 100 per cent.
	Thional Brilliant Green GG	S			
747	Thional Brown		43,219		Do.
	Thional Brown G	S			
748	Hydron Blue		19,210	$13,479.43	Germany, 100 per cent.
	Hydron Blue G Paste 20 per cent.	C			
	Hydron Blue G Powder	C			
	Hydron Blue R Paste	C			
	Hydron Blue R Powder	C			
759	Anthraflavone G		2,354		Do.
	Anthraflavone G Paste	B			
	Anthraflavone GC Paste	B			
760	Indanthrene Gold Orange G		7,617	30,690.12	Do.
	Indanthrene Gold Orange G Powder.	B			
	Indanthrene Gold Orange G Paste.	B			
	Indanthrene Gold Orange G double Paste.	B			
761	Indanthrene Gold Orange R		35,338	76,570.24	Do.
	Indanthrene Gold Orange R Paste.	B			
	Indanthrene Gold Orange RRT Paste.	B			
762	Indanthrene Scarlet GS		309	283.57	Do.
	Indanthrene Scarlet G Paste	B			
	Indanthrene Scarlet G Double Paste.	B			
	Indanthrene Scarlet GS Powder	B			
763	Indanthrene Dark Blue BD		13,917		Do.
	Indanthrene Dark Blue BD Paste.	B			
765	Indanthrene Green B		6,765		Do.
	Indanthrene Green B Paste	B			
	Indanthrene Blue Green B Paste	B			
766	Indanthrene Violet R		941		Do.
	Indanthrene Violet R Extra Paste.	B			
767	Indanthrene Violet RR		40,782	92,322.33	Do.
	Indanthrene Violet RR Extra Paste.	B			
	Indanthrene Violet RR Extra Powder.	B			
768	Indanthrene Violet B		84,165	126,408.92	Do.
	Indanthrene Black BB Paste	B			
	Indanthrene Black BB double Paste	B			
	Indanthrene Black BB Powder	B			
772	Galloflavine W Paste		24		Do.
	Galloflavine W Paste	B			
774	Alizarin Black		17,421	3,920.42	Do.
	Alizarin Black S	B			
	Alizarin Black S Paste	B			
	Alizarin Black W R	B			
	Alizarin Blue Black GT	B			
779	Alizarin Orange		500		Do.
	Alizarin Orange R Paste	By			
780	Alizarin Red		12,628	17,790.19	Do.
	Alizarin Red S Powder	B			
	Alizarin Red S	M			
	Alizarin Red SWB Powder	B			
	Alizarin Red W Powder	By			
	Alizarin Red IWS	M			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin centage of quan
			Quantity.	Invoice value.	
			Pounds.		
782	Alizarin Brown		2,728	$5,959.01	Germany, 100 p
	Alizarin Brown 20 per cent Paste.	M			
	Alizarin Brown 100 per cent Paste.	M			
	Alizarin Brown G	M			
	Anthracene Brown 20 per cent	B			
	Anthracene Brown 100 per cent	B			
	Anthracene Brown SW Powder	B			
784	Alizarin SX		49		Do.
	Alizarin SX GD	B			
787	Alizarin Bordeaux		20		Do.
	Alizarin Bordeaux GG	By			
788	Alizarin Cyanine		16,781	12,305.63	Do.
	Alizarin Cyanine NS Powder	By			
	Alizarin Cyanine WRB Powder	By			
	Alizarin Cyanine WRR Paste	By			
	Alizarin Cyanine RR Powder	By			
789	Anthracene Blue WR		103,913	132,663.51	Do.
	Anthracene Blue WR Paste	B			
	Anthracene Blue WR double Paste.	B			
790	Acid Alizarin Blue		3,539	15,184.21	Do.
	Anthracene Blue SWG	B			
	Anthracene Blue SWGG	B			
	Anthracene Blue SWGG powder	B			
	Anthracene Blue SWGG ex. powder.	B			
	Anthracene Blue SWR powder	B			
791	Indanthrene Olive G		11		Do.
	Indanthrene Olive G powder	B			
792	Cibanone Orange R		6,125	12,681.07	Switzerland, 1 cent.
	Cibanone Orange R	I			
	Cibanone Orange R paste 9 per cent.	I			
	Cibanone Green G paste	I			
	Cibanone Olive B paste	I			
795	Cibanone Yellow R		14,032	18,446.00	Do.
	Cibanone Yellow R	S			
	Cibanone Yellow R	I			
	Cibanone Yellow R paste	I			
796	Acid Alizarin Green G		1,334		Germany, 100 p
	Acid Alizarin Green 3G	M			
798	Alizarin Maroon W		2,014	2,323.93	Do.
	Alizarin Maroon	B			
	Alizarin Maroon 10 per cent paste	B			
	Alizarin Maroon 20 per cent paste	B			
799	Alizarin Cyanine G		339	147.71	Do.
	Alizarin Cyanine G powder extra	By			
	Alizarin Cyanine GG powder	By			
800	Anthracene Blue		2,049		Do.
	Anthracene Blue WB paste	B			
	Anthracene WG paste	B			
801	Anthracene Blue WGG		1,500		Do.
	Anthracene Blue WGG paste	B			
803	Alizarin Blue WX		5,585	399.92	Do.
	Alizarin Blue	M			
	Alizarin Blue JR powder	By			
	Alizarin Blue WX 10 per cent paste.	B			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
804	Alizarin Blue S		43,679	$31,291.81	Germany, 100 per cent.
	Alizarin Blue S powder	By			
	Alizarin Blue S powder	B			
	Alizarin Blue SB	M			
	Alizarin Blue 942	M			
	Alizarin Blue 942 paste	M			
	Alizarin Sky Blue B powder	By			
808	Alizarin Green S		4,254	2,172.21	Do.
	Alizarin Green S paste	B			
	Alizarin Green CE	By			
810	Helindone Yellow 3GN		2,515	9,718.85	Do.
	Helindone Yellow 3GN paste	M			
	Helindone Yellow 3GN powder	M			
	Helindone Yellow CAK powder	M			
	Helindone Yellow GG vat	M			
811	Algol Yellow 3G		570	382.63	Do.
	Algol Yellow 3G paste	By			
	Algol Yellow 3G powder	By			
	Algol Yellow 3GL paste	By			
	Algol Yellow 3GL powder	By			
812	Indanthrene Orange RT		382		Do.
	Indanthrene Orange RT paste	B			
	Indanthrene Orange RT powder	B			
814	Algol Yellow WG		4		Do.
	Algol Yellow WF	By			
815	Algol Scarlet G		959	3,028.04	Do.
	Algol Scarlet G paste	By			
	Algol Scarlet G powder	By			
816	Algol Red 5G		51		Do.
	Algol Red 5G	By			
	Algol Red 5G paste	By			
817	Algol Yellow R		2,299	14,413.00	Do.
	Algol Yellow R	By			
	Algol Yellow R powder	By			
818	Algol Pink R		1,368	1,728.72	Do.
	Algol Pink R paste	By			
	Algol Pink R powder	By			
819	Algol Red RFF		7,335	10,028.69	Do.
	Algol Red R ex. paste	By			
	Algol Red R ex. powder	By			
	Algol Red BB paste	By			
	Algol Red FF extra paste	By			
820	Algol brilliant violet R		5,856	21,871.66	Do.
	Algol Brilliant Violet R	By			
	Algol Brilliant Violet R paste	By			
	Algol Brilliant Violet RP powder	By			
821	Algol Brilliant Violet 2B		827		Do.
	Algol Brilliant Violet 2B powder	By			
	Algol Blue 3R powder	By			
822	Algol Brilliant Orange FR		482	793.11	Do.
	Algol Brilliant Orange FR powder	By			
	Algol Brilliant Orange FR paste	By			
823	Algol Violet B		69		Do.
	Algol Violet B	By			
824	Algol Orange R		406	516.88	Do.
	Algol Orange R paste	By			
	Algol Orange R powder	By			
825	Algol Red B		4,151	12,537.94	Do.
	Algol Red B Paste	By			
	Algol Red B Powder	By			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin centage of quan
			Pounds.		
827	Indanthrene Bordeaux B Extra		4,056	$2,725.68	Germany, 100 p
	Indanthrene Claret B Extra Paste	B			
	Indanthrene Claret B Powder	B			
828	Indanthrene Bordeaux B		2,741		Do.
	Indanthrene Claret B Paste	B			
829	Algol Bordeaux 3B		61	21.17	Do.
	Algol Bordeaux 3B Paste	By			
	Algol Bordeaux 3B Powder	By			
830	Indanthrene Red R		6,595	7,924.46	Do.
	Indanthrene Red R Paste	B			
	Indanthrene Red R Paste (sand free.)	B			
	Indanthrene Red R Powder	B			
	Indanthrene Red R Double Paste	B			
	Indanthrene Red R Double Paste (sand free).	B			
831	Indanthrene Red BN		4,766		Do.
	Indanthrene Red BN Extra Paste	B			
832	Indanthrene Violet RN		49		Do.
	Indanthrene Violet RN Extra Powder.	B			
833	Algol Olive R		461	140.27	Do.
	Algol Olive R Paste	By			
	Algol Olive R Powder	By			
834	Algol Grey		840	1,934.80	Do.
	Algol Grey B Paste	By			
	Algol Grey B Powder	By			
	Algol Grey BB Powder	By			
835	Helindone Orange GRN		74		Do.
	Helindone Orange GRN Paste	M			
836	Helindon Brown 3GN		15,238	4,419.19	Do.
	Helindone Brown 3GN Paste	M			
838	Indanthrene Blue RS		16,385	4,905.62	Do.
	Indanthrene Blue RS	B			
	Indanthrene Blue RS (for paper) Paste.	B			
	Indanthrene Blue RS (for paper) Powder.	B			
	Indanthrene Blue RS (for paper) Powder Triple.	B			
839	Algol Blue K		213	2,343.22	Do.
	Algol Blue K	By			
	Algol Blue K Powder	By			
840	Indanthrene Blue 3G		1,702	1,151.45	Do.
	Indanthrene Blue 3G Paste	B			
	Indanthrene Blue 3G Powder	B			
841	Indanthrene Blue GGS		500		Do.
	Indanthrene Blue GG, SP Double Paste.	B			
842	Indanthrene Blue GCD		147,620	273,910.86	Do.
	Indanthrene Blue GCD	B			
	Indanthrene Blue GCD Double Paste	B			
	Indanthrene Blue GCD Double Paste (sand free).	B			
	Indanthrene Blue GCD Powder	B			
843	Indanthrene Blue GC		4,700	8,863.00	Do.
	Indanthrene Blue GC Paste	B			
	Indanthrene Blue GC Powder	B			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
844	Algol Blue 3G		3,896	$3,245.25	Germany, 100 per cent.
	Algol Blue 3G Paste	By			
	Algol Blue 3G Powder	By			
845	Indanthrene Maroon R		46		Do.
	Indanthrene Maroon R Paste	B			
	Indanthrene Maroon R Paste (sand free).	B			
847	Algol Green B		527	2,785.62	Do.
	Algol Green B	K			
	Algol Green B Paste	By			
	Algol Green B Powder	By			
	Algol Dark Green B Powder	By			
848	Indanthrene Grey B		2,639	2,080.09	Do.
	Indanthrene Grey B Paste	B			
	Indanthrene Grey B Double Paste	B			
	Indanthrene Grey B Double Paste (sand free).	B			
	Indanthrene Grey B Powder	B			
849	Indanthrene Yellow		75,665	231,278.36	Do.
	Indanthrene Yellow G	B			
	Indanthrene Yellow G Paste	B			
	Indanthrene Yellow G Paste Fine.	B			
	Indanthrene Yellow G Paste (sand free).	B			
	Indanthrene Yellow G Double Paste.	B			
	Indanthrene Yellow G Double Paste Fine.	B			
	Indanthrene Yellow G Double Paste (sand free).	B			
	Indanthrene Yellow R	B			
	Indanthrene Yellow R Paste	B			
	Indanthrene Yellow R Paste (sand free).	B			
	Indanthrene Yellow R Double Paste.	B			
	Indanthrene Yellow R Double Paste (sand free).	B			
850	Indanthrene Blue WB		2,998		Do.
	Indanthrene Blue WB Powder	B			
851	Alizarin Direct Blue B		2,982	15,469.84	Do.
	Alizarin Direct Blue B	M			
	Alizarin Direct Blue EB	M			
	Alizarin Direct Blue ESR	M			
	Alizarin Direct Blue ESRC	M			
	Alizarin Cyanole B	C			
	Alizarin Cyanole B	K			
852	Alizarin Irisole R, D		401	536.88	Do.
	Alizarin Irisole R Powder	By			
	Alizarin Direct Violet R	M			
853	Anthraquinone Violet		1,649		Do.
	Anthraquinone Violet Powder	B			
854	Alizarin Viridine DG, FF		11,397	8,984.43	Do.
	Alizarin Viridine FF Paste	By			
	Alizarin Viridine FF Extra Paste	By			
	Alizarin Viridine FF Powder	By			
	Brilliant Alizarin Viridine F Paste	By			
856	Alizarin Astrol		15,518	43,915.28	Do.
	Alizarin Astrol B	K			
	Alizarin Astrol B Powder	B			
	Alizarin Astrol B Powder	By			
	Alizarin Rubinol GW Powder	By			
	Alizarin Rubinol 3G Powder	By			
	Alizarin Rubinol 5G Powder	By			
	Alizarin Rubinol R	K			
	Alizarin Rubinol R Powder	By			
	Alizarin Rubinol R Powder Conc.	By			
	Alizarin Rubinol R Conc	By			
	Alizarin Rubinol R Conc	K			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin centage of quanti
			Quantity.	Invoice value.	
			Pounds.		
858	Alizarin Saphirol B		28,210	$43,277.07	Germany, 100 per
	Alizarin Saphirol B Powder	K			
	Alizarin Saphirol B Powder	By			
	Alizarin Saphirol BH Powder	By			
	Alizarin Saphirol C Powder	By			
	Alizarin Saphirol SE	K			
	Alizarin Saphirol SE Powder	By			
	Alizarin Saphirol WSA Powder	By			
	Alizarin Saphirol WSA Powder	K			
859	Cynanthrol R		2,416	12,255.47	Do.
	Cynanthrol R	B			
	Cynanthrol R Powder	B			
	Cynanthrol RBA	B			
	Cynanthrol RBY	B			
	Cynanthrol RXO	B			
860	Cynanthrol G		5,127	26,800.06	Do.
	Cynanthrol 3GO Powder	B			
	Cynanthrol BGA	B			
	Cynanthrol BGA, OO	B			
861	Anthraquinone Blue SR		917		Do.
	Anthraquinone Blue SR Extra Pure.	B			
862	Alizarin Blue Black		28,802	18,328.90	Do.
	Alizarin Blue Black B Conc	By			
	Alizarin Blue Black B Powder	By			
	Alizarin Blue Black 3B Powder	By			
863	Anthraquinone Blue Green BXO		849		Do.
	Anthraquinone Blue Green BXO	B			
864	Anthraquinone Green GX, GXN		2,531		Do.
	Anthraquinone Green GX, NO	B			
865	Alizarin Direct Green G		31,851	72,416.03	Do.
	Alizarin Direct Green G	M			
	Alizarin Direct Green GG	M			
	Alizarin Cyanine Green E Powder	By			
	Alizarin Cyanine Green G Powder	By			
	Alizarin Cyanine Green G Extra Powder	By			
866	Leuco Dark Green B		120		Do.
	Leuco Dark Green B Powder	By			
867	Indanthrene Brown		3,511	901.45	Do.
	Indanthrene Brown B Double Paste	B			
	Indanthrene Brown B Double Paste Fine	B			
	Indanthrene Brown B Powder	B			
869	Algol Brown B		4,727	14,783.62	Do.
	Algol Brown R Paste	By			
	Algol Brown R Powder	By			
870	Algol Corinth R		134	1,181.14	Do.
	Algol Corinth R	By			
	Algol Corinth R Paste	By			
	Algol Corinth R Powder	By			
872	Leucol Brown B		22		Do.
	Leucol Brown B Powder	By			
873	Helindone Brown AN		16,290	42,495.53	Germany, 99 per all other, 1 per
	Helindone Brown AN 10 per cent Paste.	Q			
	Indanthrene Pink B	B			
	Indanthrene Pink B Paste	B			
	Indanthrene Pink B Paste (sand free.)	B			
	Indanthrene Pink B Double Paste	B			
	Indanthrene Red Violet RRN Paste.	B			
	Indanthrene Red Violet RRN Powder.	B			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
		Pounds.		
Indigo RB		3,691	$1,073.05	Germany, 100 per cent.
Indigo MLB, 2B	M			
Indigo MLB, 2B Paste 20 per cent.	M			
Indigo MLB, 2B Powder	M			
Helindone blue BB Paste	M			
Ciba Blue 2B		35,857	58,492.10	Germany, 8 per cent; Switzerland, 88 per cent; all other, 4 per cent.
Ciba Blue 2B	I			
Ciba Blue 2B Powder	S			
Ciba Blue 2BD Paste	I			
Brown Indigo FB Powder	By			
Durindone Blue 4B	BD			
Indigo MLB, 4B Paste 20 per cent.	M			
Indigo KB Paste	K			
Ciba Blue G		1,608		England, 100 per cent.
Durindone Blue 5B	BD			
Indigo KG		4,130	5,714.38	Germany, 76 per cent; England, 24 per cent.
Indigo MLB, 6B Paste 20 per cent.	M			
Indigo MLB, 6B Paste 40 per cent.	M			
Indigo MLB, 6B Powder	M			
Durindone Blue 6B	BD			
Brilliant Indigo B		3,503	1,512.28	Germany, 100 per cent.
Brilliant Indigo B	B			
Brilliant Indigo B 20 per cent.	B			
Brilliant Indigo B Powder	B			
Brilliant Indigo 4G		1,207	1,022.28	Do.
Brilliant Indigo 4G	B			
Brilliant Indigo 4G 20 per cent.	B			
Indigo T		827		Do.
Indigo G	B			
Indigo G Paste	B			
Helindone Green G		1,248	4,233.15	Do.
Helindone Green G Paste	M			
Helindone Green G Powder	M			
Alizarin Indigo G		1,506		Do.
Alizarin Indigo G Paste	By			
Alizarin Indigo B		291		Do.
Alizarin Indigo B Paste	By			
Alizarin Indigo 3R		3,514	2,833.58	Do.
Alizarin Indigo 3R Paste	By			
Alizarin Indigo 3R Powder	By			
Helindone Blue 3GN		2,527	10,976.00	Do.
Helindone Blue 3GN	M			
Helindone Blue 3GN 20 per cent.	M			
Helindone Blue 3GN concentrated	M			
Helindone Blue 3R Paste	M			
Ciba Violet B		13,287	68,485.29	Switzerland, 100 per cent.
Ciba Violet B	I			
Ciba Violet B Paste 10 per cent	I			
Ciba Violet B Powder	I			
Ciba Violet B Powder 95 per cent.	I			
Ciba Violet R	I			
Ciba Violet R Paste	I			
Ciba Violet R Powder	I			
Helindone Brown 2R		1,778	2,651.87	Germany, 100 per cent.
Helindone Brown 2R Paste	M			
Helindone Brown 2R Powder	M			
Helindone Brown G		2,200	4,598.92	Do.
Helindone Brown G Paste	M			
Helindone Brown G Powder	M			
Helindone Brown CR	M			
Helindone Brown CR Paste	M			
Helindone Brown CR Powder	M			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continue

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of centage of
			Quantity.	Invoice value.	
			Pounds.		
905	Thio Indigo Scarlet R		370	$714.59	England, 7 all other,
	Thio Indigo Scarlet R Paste	Q			
	Durindone Scarlet R	BD			
906	Thio Indigo Scarlet G		1,291	4,121.49	Germany, Switzerla cent.
	Thio Indigo Scarlet G Paste	K			
	Thio Indigo Scarlet 2G Paste 20 per cent.	K			
	Ciba Red G Powder	I			
	Ciba Red G Paste	I			
907	Ciba Scarlet G		25,578	45,217.43	Switzerlan per cent.
	Ciba Scarlet G	I			
	Ciba Scarlet G Extra Paste	I			
	Ciba Scarlet G Extra Paste 20 per cent.	I			
	Ciba Scarlet G Extra Powder	I			
	Helindone Fast Scarlet C Paste	I			
910	Helindone Pink		27,162	61,303.53	Germany,
	Helindone pink AN 10 per cent	M			
	Helindone Pink BN 10 per cent	M			
	Thio Indigo Pink AN Paste	K			
	Thio Indigo Pink BN Paste	K			
	Thio Indigo Rose AN Paste	K			
	Thio Indigo Pink Rose BW Paste	K			
912	Thio Indigo Red B		275	414.57	Do.
	Thio Indigo Red B Paste	K			
	Thio Indigo Red B Powder	K			
913	Helindone Orange R		3,155	49,488.63	Do.
	Helindone Orange R 100 per cent	M			
	Helindone Orange R paste	M			
	Helindone Orange R powder	M			
	Thio Indigo Orange R paste	K			
914	Helindone Orange D		17		Do.
	Helindone Orange D powder	M			
915	Helindone Fast Scarlet R		3,748	14,177.91	Do.
	Helindone Fast Scarlet R	M			
	Helindone Fast Scarlet R paste	M			
	Helindone Fast Scarlet R powder	M			
916	Helindone Scarlet S		56		Do.
	Helindone Scarlet S paste	M			
917	Helindone Red B		200		Do.
	Helindone Red B paste	M			
918	Helindone Red 3B		4,385	17,554.88	Do.
	Helindone Red 3B paste	M			
	Helindone Red 3B powder	M			
920	Helindone Violet		16,882	75,897.35	Do.
	Helindone Violet B paste	M			
	Helindone Violet B powder	M			
	Helindone Violet BB paste	M			
	Helindone Violet BB powder	M			
	Helindone Violet R paste	M			
	Helindone Violet R powder	M			
	Thio Indigo Violet B paste	M			
921	Helindone Grey BB, BR		508	427.65	Do.
	Helindone Grey BB paste	M			
	Helindone Grey BB powder	M			
	Helindone Grey BR	M			
	Helindone Grey BR powder	M			
	Helindone Black RRG paste	M			
923	Ursol		1,600	4,467.00	Do.
	Ursol A	A			
	Ursol A (lumps)	A			
	Ursol 2G	A			
	Ursol 4G	A			
	Ursol P	A			
	Ursol 4R	A			
	Ursol 4R paste	A			
	Ursol Grey B	A			

TABLE 13.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED DIRECT COLORS.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
	Aminogene Blue RN	I	1,942		Switzerland, 100 per cent.
	Benzo Bordeaux		1,314	$636.22	Germany, 100 per cent.
	Benzo Bordeaux 6B	By			
	Benzo Bordeaux 6B	K			
	Benzo Chrome Blue Black B	By	1,111		Do.
	Benzo Chrome Brown		4,500	3,595.97	Do.
	Benzo Chrome Brown CR	By			
	Benzo Chrome Brown G	By			
	Benzo Chrome Brown G	K			
	Benzo Chrome Brown 3R	By			
	Benzo Copper Blue B	By	1,422		Do.
	Benzo Fast Black		8,485	10,907.46	Do.
	Benzo Fast Black	By			
	Benzo Fast Black L	By			
	Benzo Fast Black L	K			
	Benzo Fast Blue		2,168	2,789.60	Do.
	Benzo Fast Blue G	By			
	Benzo Fast Blue FFL	By			
	Benzo Fast Bordeaux 6BL	By	1,887		Do.
	Benzo Fast Brown 3GL	By	353		Do.
	Benzo Fast Eosine BL	By	536		Do.
	Benzo Fast Heliotrope		2,559	2,770.33	Do.
	Benzo Fast Heliotrope BL	By			
	Benzo Fast Heliotrope 4BL	By			
	Benzo Fast Heliotrope 2RL	By			
	Benzo Fast Orange		3,290	1,998.94	Do.
	Benzo Fast Orange 2RL	By			
	Benzo Fast Orange S	By			
	Benzo Fast Scarlet 4FB	By	439		Do.
	Benzo Navy Blue B	By	24		Do.
	Benzo Red 12B	By	1,129		Do.
	Benzo Rhoduline Red		922		Do.
	Benzo Rhoduline Red B	By			
	Benzo Rhoduline 3B	By			
	Benzoin Black	BK	1,764		Do.
	Benzoin Blue Black RH, 150 per cent.	BK	287		Do.
	Brilliant Benzo Green B	By	465		Do.
	Brilliant Benzo Violet		540		Do
	Brilliant Benzo Violet B	By			
	Brilliant Benzo Violet 2R	By			
	Brilliant Fast Blue		2,465	7,629.88	Do.
	Brilliant Fast Blue B	By			
	Brilliant Fast Blue B	K			
	Brilliant Fast Blue B Conc	K			
	Brilliant Fast Blue B Conc. 50 per cent.	By			
	Brilliant Fast Blue 3BX	By			
	Brilliant Fast Blue 2G	By			
	Brilliant Fast Blue 2G	K			
	Brilliant Fast Blue 2G Conc	K			
	Brilliant Fast Blue 2G Conc. 60 per cent.	By			
	Brilliant Sky Blue 8G Extra	By	326		Do.
	Chicago Red		1,102		Switzerland, 100 per cent.
	Chicago Red	G			
	Chicago Red 111	G			
	Chloramine Brilliant Red		23,375	79,104.66	Do.
	Chloramine Brilliant Red 8B	S			
	Chloramine Brilliant Red 8B Conc.	S			
	Chloramine Brilliant Red 8B Conc. Pure.	S			
	Chloramine Brown 2R	S	1,102		Do.
	Chloramine Red		10,103	7,985.15	Germany, 100 per cent.
	Chloramine Red 8BS	K			
	Chloramine Red 8BS	By			
	Chloramine Violet		499		Do.
	Chloramine Violet FFB	By			
	Chloramine Violet R	By			
	Chlorazol Brown G	BD	6,725		England, 100 per cent.
	Chlorazol Dark Green PL	BD	4,844		Do.
	Chlorazol Pink R	RHS	200		Do.
	Columbia Brown RK	A	400		Germany, 100 per cent.
	Columbia Fast Black G Extra	A	240		Do.
	Cupranite Brown G	I	500		Switzerland, 100 per cent.

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED DIRECT COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin centage of quand
			Quantity.	Invoice value.	
			Pounds.		
	Cutch Brown 2R	S	4,069		Switzerland, 10 cent.
	Diamine Azo Blue R	C	102		Germany, 100 per
	Diamine Bordeaux S	C	761		Do.
	Diamine Catechine		906		Do.
	Diamine Catechine B	C			
	Diamine Catechine G	C			
	Diamine Fast Blue		11,617	$19,993.23	Do.
	Diamine Fast Blue FFB	C			
	Diamine Fast Blue FFB	K			
	Diamine Fast Bordeaux 6BS	C	399		Do.
	Diamine Fast Brown		3,900	3,359.28	Do.
	Diamine Fast Brown G	C			
	Diamine Fast Brown R	C			
	Diamine Fast Gray BN	C	1,678		Do.
	Diamine Fast Orange		299		Do.
	Diamine Fast Orange EG	C			
	Diamine Fast Orange ER	K			
	Diamine Fast Scarlet		652	845.67	Do.
	Diamine Fast Scarlet 8BN	C			
	Diamine Fast Scarlet 10BF	C			
	Diamine Fast Scarlet GG	C			
	Diamine Fast Violet FFBN	C	108		Do.
	Diamine Orange		1,100	1,469.15	Do.
	Diamine Orange B	C			
	Diamine Orange F	C			
	Diamine Orange G	C			
	Diamine Violet Red		79	68.47	Do.
	Diamine Violet Red	C			
	Diamine Violet Red K Extra	C			
	Diamineral Blue CVB	C	51		Do.
	Dianil Brown 3GO	M	200		Do.
	Dianil Light Red 8BW	M	4		Do.
	Dianol Dark Blue B	BD	5,528		England, 100 per
	Dianol Fast Blue 2B	BD	4,480		Do.
	Dianol Fast Red		1,620	5,036.78	Do.
	Dianol Fast Red K	Lev			
	Dianol Fast Red K	BD			
	Dianol Fast Yellow ARX	BD	1,115	1,380.81	Do.
	Dianol Violet R	BD	560		Do.
	Diazanil Pink B	M	420		Germany, 100 pe
	Diazanil Scarlet B	M	100		Do.
	Diazamine Fast Orange	Q	1,198		Do.
	Diazo Bordeaux	By	902		Do.
	Diazo Brilliant Green 3G	By	2		Do.
	Diazo Brilliant Orange		116		Do.
	Diazo Brilliant Orange GR Extra	By			
	Diazo Brilliant Orange 5G Extra	By			
	Diazo Brilliant Scarlet		8,261	21,530.45	Do.
	Diazo Brilliant Scarlet 3B Extra	By			
	Diazo Brilliant Scarlet 6B Extra	By			
	Diazo Brilliant Scarlet Extra BA	By			
	Diazo Brilliant Scarlet Extra 3BA	By			
	Diazo Brilliant Scarlet 2BL Extra Conc.	By			
	Diazo Brilliant Scarlet 5BL	By			
	Diazo Brilliant Scarlet G Extra	By			
	Diazo Brilliant ROR Extra	By			
	Diazo Brilliant S4B	By			
	Diazo Bordeaux 7B	By	181		Do.
	Diazo Brown		937		Do.
	Diazo Brown 3G	By			
	Diazo Brown 3RB	By			
	Diazo Fast Bordeaux		1,421	3,086.30	Do.
	Diazo Fast Bordeaux BL	By			
	Diazo Fast Bordeaux BL	K			
	Diazo Fast Red		520		Do.
	Diazo Fast Red 5BL	By			
	Diazo Fast Red 7BL	By			
	Diazo Fast Violet		489	1,178.50	Do.
	Diazo Fast Violet BL	By			
	Diazo Fast Violet BL	K			
	Diazo Fast Violet 3RL	By			
	Diazo Fast Yellow		185	298.37	Do.
	Diazo Fast Yellow G	By			
	Diazo Fast Yellow 2G	By			
	Diazo Fast Yellow R	By			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED DIRECT COLORS—Continued.

Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
		Pounds.		
Diazo Geranine B Extra	By	804		Germany, 100 per cent.
Diazo Indigo Blue		276	$1,095.50	Do.
Diazo Indigo Blue 4GL	K			
Diazo Indigo Blue 4GL	By			
Diazo Olive G	By	4		Do.
Diazo Rubine		1,356		Do.
Diazo Rubine B	By			
Diazo Rubine B Conc	By			
Diazo Sky Blue		3,014	3,854.03	Do.
Diazo Sky Blue B	By			
Diazo Sky Blue 3G	By			
Diazo Sky Blue 3G	K			
Diazo Yellow R	By	2		Do.
Diphenyl Violet BVC	G	220		Switzerland, 100 per cent.
Direct Blue BXR	S	1,102		Do.
Direct Brown		3,880	2,453.94	Do.
Direct Brown G	G			
Direct Brown 3GNC	G			
Direct Fast Green B	S	110		Do.
Direct Fast Yellow CR	Q	1,729		
Direct Pure Blue 400 per cent	G	2,204		Do.
Direct Violet B	Q	992		Do.
Heligoland Blue 6B	G	1,102		Do.
Naphthamine Fast Black VG Conc. 30 per cent.	K	1,124		Germany, 100 per cent.
Naphthamine Fast Green B	K	649		Do.
Naphthamine Violet O	Q	600		
Naphthogen Blue		5,484		Do.
Naphthogen Blue BM	A			
Naphthogen Blue QR	A			
Naphthogen 4R	A			
Oxamine Black		791	1,542.13	Do.
Oxamine Black BB	M			
Oxamine BBN	B			
Oxamine BX	B			
Oxamine Brown		650	954.69	Do.
Oxamine Brown 3G	B			
Oxamine Brown GX	B			
Oxamine Brown 3GX	B			
Oxamine Fast Blue 6BX	B	112		Do.
Oxamine Fast Pink		413	340.51	Do.
Oxamine Fast Pink BNE	B			
Oxamine Fast Pink BX	B			
Oxamine Fast Pink BX Conc	B			
Oxamine Light Blue B	B	525		Do.
Oxamine Light Brown		400	674.00	Do.
Oxamine Light Brown G	B			
Oxamine Light Brown R	B			
Oxamine Pure Blue 5BN	B	287		Do.
Oxamine Yellow 3G	A	40		Do.
Oxydiamine Black SOOO	C	1,250		Do.
Oxydiamine Brown RN	C	203		Do.
Oxydiaminogen		524		Do.
Oxydiaminogen ED	C			
Oxydiaminogen OB	C			
Pluto Black G	By	448		Do.
Pluto Brown		498		Do.
Pluto Brown GG	By			
Pluto Brown R	By			
Polyphenyl Orange		1,724	1,904.31	Switzerland, 100 per cent.
Polyphenyl Orange RC	G			
Polyphenyl Orange SF	G			
Polyphenyl Orange SP	G			
Pyrazol Orange G	S	24,329		Do.
Rosanthrene		1,501	3,455.95	Do.
Rosanthrene R Paste	S			
Rosanthrene R	S			
Rosanthrene R Paste	I			
Rosanthrene Bordeaux		1,502	3,009.20	Do.
Rosanthrene Bordeaux B	I			
Rosanthrene Bordeaux B Paste	I			
Thional Yellow B	S	463		Do.

TABLE 13.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED DIRECT COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin contage of quanti
			Quantity.	Invoice value.	
			Pounds.		
	Toluylene Yellow		1,251	$1,742.51	Germany, 100 per
	Toluylene Yellow G	By			
	Toluylene Yellow G	K			
	Toluylene Yellow G Conc	By			
	Triazol Bordeaux B	GrE	66		Do.
	Triazol Brown 8000	GrE	2,504		Do.
	Trisulphon Bronze B	S	661		Switzerland, 100 cent.
	Zambesi Black		41,670	57,061.33	Germany, 100 per
	Zambesi Black D	A			
	Zambesi Black V	A			
	Zambesi Rubine B	A	333		Do.

UNIDENTIFIED VAT COLORS.

	Algol Brown		496	$2,248.49	Germany, 100 per
	Algol Brown G Powder	By			
	Algol Brown R Powder	By			
	Algol Yellow 3GL Powder	By	33		Do.
	Chloranthrene Bordeaux R Paste	BD	10		England, 100 per
	Cibanon Green		1,645	3,460.48	Switzerland, 100 cent.
	Cibanon Green B	S			
	Cibanon Green B Paste, 10 per cent.	I			
	Helindone Black for Printing, Paste	M	154		Germany, 100 per
	Helindone Fast Scarlet B Powder	M	40		Do.
	Helindone Red BB	M	1,000		Do.
	Helindone Yellow CAK Powder	M	121		Do.
	Indanthrene Blue		107	177.91	Do.
	Indanthrene Blue RC Powder	B			
	Indanthrene Blue RZ Triple Powder.	B			
	Indanthrene Bluish Green		101	273.24	Do.
	Indanthrene Bluish Green BN	B			
	Indanthrene Bluish Green BN Paste (Sandfree)	B			
	Indanthrene Brown		4,202	3,092.89	Do.
	Indanthrene Brown BB Paste	B			
	Indanthrene Brown RR Paste	B			
	Indanthrene Brown 3R Paste	B			
	Indanthrene Brown 3R Paste Fine	B			
	Indanthrene pink		153		Do.
	Indanthrene Pink BL Powder	B			
	Indanthrene Pink BS Powder	B			
	Indanthrene Printing Black BGN Paste.	B	841		Do.
	Indigo Scarlet S Paste	B	231		Do.
	Indanthrene Violet		4,843	5,087.99	Do.
	Indanthrene Violet BN Paste fine.	B			
	Indanthrene Violet BN Extra Paste.	B			
	Indanthrene Violet BN Extra Paste (Sandfree).	B			
	Thio Indigo Violet R Paste	K	100		Do.
	Thio Indigo Yellow GW	K	340		Do.
	Vat Violet		330	2,860.00	
	Vat Violet B	Q			
	Vat Violet R Paste	Q			
	Vat Yellow R Paste	Q	440		

UNIDENTIFIED ACID COLORS.

	Acetyl Red BB	B	402		Germany, 100 per
	Acid Blue		480	$766.64	Germany, 58 per
	Acid Blue AS Conc	BK			Switzerland, 4
	Acid Blue BS Conc	BK			cent.
	Acid Blue RBS	I			
	Acid Bordeaux	S	220		Switzerland, 100 cent.

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED ACID COLORS—Continued.

Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
		Pounds.		
Acid Green		1,055		Germany, 100 per cent.
Acid Green	M			
Acid Green CD	M			
Acid Marine Blue BM	DH	22		Switzerland, 100 per cent.
				Do.
Acid Milling Black B	G	2,094		
Acid Rhodamine		975	$2,974.80	Germany, 55 per cent; Switzerland, 40 per cent; all other, 5 per cent.
Acid Rhodamine	Q			
Acid Rhodamine B	B			
Acid Rhodamine BG	B			
Acid Rhodamine R	B			
Acid Rhodamine 3R	I			
Acid Violet		113	546.88	Germany, 90 per cent; all other, 10 per cent.
Acid Violet 4RN	B			
Acid Violet 4RO	B			
Acid Violet 3BNONY	Q			
Alkali Blue		796	2,572.88	Germany, 100 per cent.
Alkali Blue 4BE	A			
Alkali Blue 2G	M			
Alkali Blue 2R	M			
Alkali Fast Green		1,085	1,418.58	Do.
Alkali Fast Green 3B	By			
Alkali Fast Green 3B	K			
Alkali Fast Green 3G	By			
Amine Black Green B	A	200		Do.
Anthra Cyanine		289	827.77	Do.
Anthra Cyanine FL conc. 50 per cent.	By			
Anthra Cyanine FL conc. 60 per cent.	By			
Anthra Cyanine 3FL	By			
Anthra Cyanine 3FL conc. 40 per cent.	By			
Amido Napthol Black 3BL	M	3,000		Do.
Anthosine		146	399.29	Do.
Anthosine 3B	B			
Anthosine 5B	Q			
Azo and Black 3BL Extra	M	3,480		Do.
Azo Geranine	BD	1,120		England, 100 per cent.
Azo Orseille KWS		5		
Azo Dark Green A	G	1,918		Switzerland, 100 per cent.
Azo Rhodine		2,867	4,908.93	Do.
Azo Rhodine 2G	S			
Azo Rhodine 6B	S			
Azo Wool Violet 7B	C	99		Germany, 100 per cent.
Blue		1,454		Do.
Blue BS IC	GrE			
Blue BS ICoo	GrE			
Brilliant Acid Blue		342	837.94	Do.
Brilliant Acid Blue CB	By			
Brilliant Acid Blue CB	K			
Brilliant Anthrazurol	B	11		Do.
Brilliant Milling Blue B	C	851		Do.
Brilliant Fast Red L, 125 per cent	BK	165		Do.
Brilliant Milling Red R	C	99		Do.
Brilliant Silk Blue 10B	A	11		Do.
Brilliant Sulphon Red 10B	S	1,656		Switzerland, 100 per cent.
Brilliant yellow	S	220		Do.
Durasol Acid Blue B	BD	4,699		England, 100 per cent.
Erio Fast Fuchsine BBL	G	220		Switzerland, 100 per cent.
Erio Violet		7,672		Do.
Erio Violet BC	G			
Erio Violet RL Supra	G			
Fast Acid Cyanine		1,210		Germany, 100 per cent.
Fast Acid Cyanine GR	By			
Fast Acid Cyanine 5R	By			
Fast Acid Green		1,925	2,872.44	Do.
Fast Acid Green BB	M			
Fast Acid Green BB Extra	M			
Fast Acid Marine Blue HBBX	B	500		Do.
Fast Brilliant Scarlet 4B	Q	1,300		
Formyl Blue BX	C	203		Do.

TABLE 19.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED ACID COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin and percentage of quantity.
			Pounds.		
	Guinea Fast Red		300		Germany, 100
	Guinea Fast Red	A			
	Guinea Fast Red 2R	A			
	Guinea Fast Yellow 3G	A	150		Do.
	Ink Blue BJTBNoo	GrE	29		Do.
	Kiton Pure Blue V	I	247		Switzerland, cent.
	Kiton Fast Yellow S	I	441		Do.
	Kiton Yellow S	I	1,001		Do.
	Marigold Acid Yellow	Q	100		
	Methyl Soluble Blue 3S conc	B	100		Germany, 100
	Milling Red 4BA	A	100		Do.
	Milling Yellow		340	$81.00	Do.
	Milling Yellow O	C			
	Milling Yellow OO	C			
	Milling Yellow GA	A			
	Milling Yellow 3G	C			
	Milling Yellow 3G, 200 per cent	C			
	Naphthalene Black 12B	BD	2,240		England, 100 p
	Naphthalene Blue B	M	300		Germany, 100
	Naphthamine Fast Brown BL	K	229		Do.
	Naphthylamine Black S	C	914		Do.
	Navy Blue		1,181	1,928.91	Germany, 34 p
	Navy Blue A	I			Switzerland, cent.
	Navy Blue KWSG	C			
	Navy Blue KWSR	C			
	New Fast Red GGL conc	BK	1,598		Germany, 100
	Nitro orange		662		Do.
	Nitro orange ●T, 115 per cent	BK			
	Nitro orange RR conc., 110 per cent	BK			
	Orange RT Paste	B	77		Do.
	Palatine Light Yellow R	B	88		Do.
	Patent Blue		750	657.95	Do.
	Patent Blue E	M			
	Patent Blue AJI	M			
	Patent Blue H Superfine	M			
	Patent Pure Blue O	M	51		Do.
	Polar Red G Conc	G	1,653		Switzerland, cent.
	Resorcin Havana Brown	BK	441		Germany, 100
	Scarlet Z	BK	1,186		Do.
	Special Blue G	B	194		Do.
	Sulphon Acid Green B	By	101		Do.
	Sulphon Orange G	By	99		Do.
	Sulphon Yellow		234		Do.
	Sulphon Yellow 5G	By			
	Sulphon Yellow R	By			
	Victoria Fast Violet		2,167		Do.
	Victoria Fast Violet B Extra	By			
	Victoria Fast Violet 2R Extra	By			
	Victoria Navy Blue		4,601	5,886.51	Do.
	Victoria Navy Blue B	By			
	Victoria Navy Blue B	K			
	Wool Black		3,527	1,500.60	Do.
	Wool Black 6BA	CG			
	Wool Black D Extra 100 per cent	CG			
	Wool Black 3R Extra	CG			
	Wool Blue RL	G	3,197		Switzerland, cent.
	Wool Fast Blue		3,544		Germany, 100
	Wool Fast Blue BL	By			
	Wool Fast Blue GL	By			
	Wool Fast Violet		498	1,111.78	Do.
	Wool Fast Violet B	By			
	Wool Fast Violet B Conc	K			
	Wool Fast Violet B Conc. 50 per cent.	By			
	Wool Green N. B	Q	2,310		
	Wool Violet R	K	145		Do.
	Xylene Fast Green B	S	12,767		Switzerland, cent.
	Xylene Light Green		937		Do.
	Xylene Light Green B	S			
	Xylene Light Green 2B	S			

UNIDENTIFIED SULPHUR COLORS.

Cross Dye Green		15,898		England, 100 p
Cross Dye Green B	BD			
Cross Green 2G conc	BD			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED SULPHUR COLORS—Continued

ults & o.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
	Cross Dye Yellow		7,670		England, 100 per cent.
	Cross Dye Yellow	BD			
	Cross Dye Yellow Y	BD			
	Eclipse Brown		8,377	$5,631.02	Switzerland, 100 per cent.
	Eclipse Brown BK	G			
	Eclipse Brown 3GK	G			
	Immedial Direct Blue B	C	450		Germany, 100 per cent.
	Immedial Olive B	C	201		Do.
	Immedial Purple C	C	99		Do.
	Ingrosine Base M	Q	1,000		
	Pyrazol Orange G	S	110		Switzerland, 100 per cent.
	Sulphur Green		1,716		England, 100 per cent.
	Sulphur Green B	BD			
	Sulphur Green 2G Conc	BD			
	Sulphur Yellow	BD	13,144		Do.
	Thiogene New Blue 2RL	M	245		Germany, 100 per cent.
	Thionol Brilliant Blue		8,158	29,350.40	Switzerland, 100 per cent.
	Thionol Brilliant Blue 6B	S			
	Thionol Brilliant Blue 6B Conc. Pure.	S			
	Thionol Brilliant Blue 6B Conc	S			
	Thionol Brilliant Green		26,806		England, 100 per cent.
	Thionol Brilliant Green 4GX	BD			
	Thionol Brilliant Green 4GK	BD			
	Thionol Brilliant Yellow		771		Switzerland, 100 per cent.
	Thionol Brilliant Yellow G	S			
	Thionol Brilliant Yellow GG	S			
	Thionol Brown		8,916	3,542.72	England, 100 per cent.
	Thionol Brown GD	BD			
	Thionol Brown P	BD			
	Thionol Brown R	BD			
	Thionol Corinth RBX	BD	4,268		Do.
	Thionol Green DV	BD	24,040		Do.
	Thionol Orange		3,003		Switzerland, 100 per cent.
	Thionol Orange G	S			
	Thionol Orange O	S			
	Thionol Yellow		36,056	50,688.00	England, 80 per cent; Switzerland, 20 per cent.
	Thionol Yellow C	S			
	Thionol Yellow G	S			
	Thionol Yellow O Conc	S			
	Thionol Yellow 3RD	BD			
	Thionine Green 2G	Q	16,747		
	Thionone Corinth B Conc	RHS	500		England, 100 per cent.

UNIDENTIFIED MORDANT AND CHROME COLORS.

	Acid Alizarin Blue Black A	M	60		Germany, 100 per cent.
	Acid Alizarin Black		3,650	1,932.38	Do.
	Acid Alizarin Black EN	M			
	Acid Alizarin Black ENT Conc	M			
	Acid Alizarin Black SET Paste	M			
	Acid Alizarin Grey G	M	8,551		Do.
	Acid Chrome Violet		399		Do.
	Acid Chrome Violet B	By			
	Acid Chrome Violet B	K			
	Acid Milling Red		2,293		Switzerland, 100 per cent.
	Acid Milling Red G	G			
	Acid Milling Red G Conc	G			
	Alizarin Claret		276	1,398.33	Germany, 100 per cent.
	Alizarin Claret 100 per cent	M			
	Alizarin Claret R Paste	M			
	Alizarin Claret R Powder	M			
	Alizarin Cyanine Green 3G Powder	By	1,179		Do.
	Alizarin Cyanole		16		Do.
	Alizarin Cyanole EF	C			
	Alizarin Cyanole SR	C			
	Alizarin Delphinol		11,800	41,522.89	Germany, 97 per cent; all other, 3 per cent.
	Alizarin Delphinol BS	BD			
	Alizarin Delphinol SE	BD			
	Alizarin Delphinol Blue SE	Q			
	Alizarin Emeraldole		599		Germany, 100 per cent.
	Alizarin Emeraldole G	K			
	Alizarin Emeraldole G Powder	K			
	Alizarin Emeraldole G Powder	By			

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED MORDANT AND CHROME COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin and percentage of quantity.
			Quantity.	Invoice value.	
			Pounds.		
	Alizarin Rubinol 3 G Powder	By	476		Germany, 100 p
	Alizarin Saphirole WSA Powder	By	994		Do.
	Alizarin Sky Blue 3R Powder	By	112		Do.
	Alizarin Uranol 2B Powder	By	64		Do.
	Anthracene Blue		354		Do.
	Anthracene Blue SWB	B			
	Anthracene SWB Powder	B			
	Anthracene Blue Black C	M	500		Do.
	Anthracene Brown WLP Paste	BD	634		England, 100 p
	Anthracene Chromate Black LC	C	110		Germany, 100 p
	Anthracyanine		8,189	$19,071.45	Do.
	Anthracyanine FL	K			
	Anthracyanine FL Conc	K			
	Anthracyanine FL Conc. 60 per cent.	By			
	Anthracyanine 3FL	K			
	Anthracyanine 3FL Conc	By			
	Brilliant Alizarin Cyanine		1,867	508.61	Do.
	Brilliant Alizarin Cyanine 3G Paste.	By			
	Brilliant Alizarin Cyanine 3G Powder.	By			
	Brilliant Alizarin Viridine F Paste	By	615		Do.
	Brilliant Anthrazurol		68		Germany, 84 p
	Brilliant Anthrazurol	Q			all other, 16 p
	Brilliant Anthrazurol Powder	B			
	Brilliant Chrome Blue P	S	220		Switzerland, 1 cent.
	Brilliant Phosphine R	S	331		Do.
	Chromazurine		772	2,844.53	Do.
	Chromazurine C	DH			
	Chromazurine E Powder	DH			
	Chromazurine G Powder	DH			
	Chrome Black PV	G	2,205		Do.
	Chrome Brilliant Blue G	G	1,653		Do.
	Chrome Brown RVV	G	661		Do.
	Chromochlorine GRR Powder	DH	110		Do.
	Chromophenine FKN Powder	DH	661		Do.
	Chrome Red B	S	441		Do.
	Chromorhodine		441		Do.
	Chromorhodine B Powder	DH			
	Chromorhodine R Powder	DH			
	Chrome Violet CG Powder	DH	110		Do.
	Chrome Yellow BN	G	2,205		Do.
	Erio Chrome Red PEI	G	441		Do.
	Erio Chrome Violet B	G	9,481		Do.
	Fast Mordant Blue B	M	600		Germany, 100 p
	Gallo Violet D	By	51		Do.
	Meta Chrome Blue Black		2,257	430.50	Do.
	Meta Chrome Blue Black 2BX	A			
	Meta Chrome Blue Black R	A			
	Meta Chrome Olive B	A	2,242		Do.
	Meta Chrome Yellow YDC	Q	100		
	Mordant Yellow G	B	150		Do.
	New Gallophenine		398		Do.
	New Gallophenine R	By			
	New Gallophenine R	K			
	Omega Chrome Brown		11,861	11,510.09	Switzerland, 1 cent.
	Omega Chrome Brown CPM	S			
	Omega Chrome Brown PB	S			
	Omega Chrome Brown P	S			
	Omega Chrome Red B	S	661		Do.
	Palatine Chrome Brown RX	B	4		Germany, 100 p
	Salicine Chrome Red EX	K	66		Do.
	Ultra Orange R	S	110		Switzerland, 1 cent.
	Violet au Chrome GG Powder	DH	220		Do.

TABLE 18.—*Imports of dyes during the calendar year 1920*—Continued.

UNIDENTIFIED BASIC COLORS.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
			Pounds.		
	Diazine Red	K	100		Germany, 100 per cent.
	Cartamine DD	B	3,653		Do.
	Isamine Blue 8B	K	50		Do.
	Para Phosphine G	C	220		Do.
	Rhodamine 7GN Extra	B	42		Do.
	Rhoduline Heliotrope		102	$289.10	Do.
	Rhoduline Heliotrope B	M			
	Rhoduline Heliotrope B	By			
	Rhoduline Heliotrope 3B	By			
	Rosalone B Conc	M	15		Do.
	Rosazeine 6G Extra	M	40		Do.
	Tannin Yellow GE	Q	125		
	Turquoise Blue BR	By	31		Do.

UNIDENTIFIED DYES FOR COLOR LAKES.

	Brilliant Lake Blue G Extra	By	498		Germany, 100 per cent.
	Helio Bordeaux BL Powder	By	500		Do.
	Helio Fast Blue BL Conc	By	6,199		Do.
	Lithol Fast Orange R Paste	B	710		Do.

UNIDENTIFIED UNCLASSIFIED COLORS.

	Alkaline Blue BB	M	780		Germany, 100 per cent.
	Aniline Dyes	Q	250		
	Bistre T	Q	2,755		
	Brown No. 4	By	1,764		Do.
	Corolene BT Conc	B	25		Do.
	Chargee Blue OB	M	500		Do.
	Gris Moderne RC	DH			
	Gris Moderne RC Powder	DH	1,323		Switzerland, 100 per cent.
	Japan Black B Ex	B	146		Germany, 100 per cent.
	Leather Black BO Lumps	B	110		Do.
	Metamine Brown	S	2,090		Switzerland, 100 per cent.
	Parasulphone Brown G	S	661		Do.
	Parasulphone Brown V	S			
	Peacock Blue	Q	1,182		
	Sapphire Blue		44		Do.
	Sapphire Blue R	DH			
	Sapphire Blue 3R	DH			
	Sulfonine Blue 5R Extra	S	441		Do.
	Tartraphenine		1,051	962.76	Switzerland, 32 per cent; all other, 68 per cent.
	Tartraphenine	S			
	Tartraphenine Conc pure	Q			
	Tessamine Green B	BD	120		England, 100 per cent.

Part IV

APPENDIX

STATISTICS OF IMPORTS AND EXPORTS

DIRECTORY OF MANUFACTURERS OF COAL-TAR PRODUCTS

PART IV.

STATISTICS OF IMPORTS AND EXPORTS.

TABLE 19.—*Imports of coal-tar products entered for consumption, 1917 to 1920.*

[Act of Sept. 8, 1916.]

GROUP I, CRUDE (FREE).

	Calendar years.							
	1917		1918		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate...pounds..	151,254	$9,804	155,236	$17,260	1,965,289	$187,788	192,692	$19,848
Anthracene oil....gallons..	61,200	3,105	.....	.....	18,699	3,994	15,054	3,915
Benzol.....pounds..	3,598,733	341,700	2,673,855	87,570	217,865	5,617	486,619	10,868
Cresol.....do....	7,665,442	532,529	8,873,271	779,045	6,435,650	557,214	10,318,070	901,381
Dead or creosote oil, gallons.....	9,817,085	786,638	1,545,247	162,860	11,268,379	1,374,217	18,427,152	3,795,359
Naphthalene having a solidifying point less than 79° C.....pounds..	5,206,980	175,554	3,902,731	130,098	3,239,256	92,265	15,012,006	530,219
Pyridine and quinoline, pounds.....	12,247	1,480	9,237	1,036	165,064	20,543	863,456	168,800
Coal tar, crude....barrels..	6,780	10,745	13,087	21,200	22,339	38,476	11,901	24,140
Pitch, coal tar.....do....	5,926	12,039	14,029	29,095	3,364	8,598	8,780	21,022
Metacresol, orthocresol, and paracresol—purity less than 90 per cent, pounds.....	20,708	1,404	.....	.....	11,200	1,221	.....	.....
Toluol.....pounds..	.....	.....	.....	.....	1,195,706	30,768	.....	.....
Xylol.....do....	9,332	2,928	.....	.....	.....	.....	.....	.....
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f., pounds.....	.....	10,448	.....	2,756	380,525	6,334	240,026	14,046
All other distillates, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate, pounds.....	.....	1,502	.....	10,473	104,568	10,548	.....	.....
Anthracene, purity less than 25 per cent..pounds..	(1)	(1)	18	5	82,609	2,022	202,569	16,590
Acenaphthene, cumol fluorene, methylanthracene and methylnaphthalene, pounds.....	(1)	(1)	.....	.....	15,755	946	.....	.....
Carbazol, purity less than 25 per cent .....pounds..	(1)	(1)	.....	.....	112	82	.....	.....

[1] Imports not available by calendar year.

TABLE 19.—*Imports of coal-tar products entered for consumption, 1917 to 1920*—Con.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND).

Article and years.	Quantity.	Value.	Duty.	Actual and computed ad-valorem rate.
Not colors, dyes or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.:				
Acids—				
Amidosalicylic—	*Pounds.*			*Per cent.*
1917				
1918				
1919				
1920	11,199	$8,182	$1,507	18.42
Benzoic—				
1917	4,653	20,539	3,190	15.53
1918	1,791	14,060	2,154	15.32
1919	63	374	58	15.42
1920	250	1,087	169	15.56
Carbolic (phenol) which on being subjected to distillation yields in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate—				
Crystal—				
1917	30,676	4,954	1,510	30.48
1918	148,261	47,085	10,769	22.87
1919				
1920				
Liquid—				
1917	314,585	24,246	11,502	47.44
1918	134,406	15,186	5,638	37.13
1919	2,061	264	91	34.53
1920	1,040	244	63	25.86
Salicylic—				
1917	26,273	23,575	4,193	17.79
1918	117	112	20	17.62
1919				
1920				
Amidonaphthol—				
1917				
1918				
1919	150	72	15	20.21
1920				
Amidophenol—				
1917				
1918				
1919	1,028	2,417	388	16.06
1920				
Aniline oil—				
1917				
1918				
1919				
1920	220	72	16	22.64
Aniline salt—				
1917				
1918	21,273	3,250	1,019	31.36
1919				
1920	4	1	.25	25.00
Anthracene, purity of 25 per cent or more—				
1917				
1918				
1919	51,895	8,011	2,499	31.19
1920	648,095	87,413	29,314	33.54
Anthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
Benzaldehyde—				
1917				
1918				
1919	24,472	17,790	3,280	18.44
1920	9,479	5,928	1,126	19.00
Benzylchloride—				
1917	5	7	1	16.95
1918				
1919	1,000	430	90	20.81
1920	150	22	7	32.05
Binitrotoluol—				
1917	61,632	10,471	3,111	29.71
1918	22,635	3,333	1,066	31.98
1919	6,896	1,331	372	27.95
1920	4,692	1,216	300	24.64

TABLE 19.—*Imports of coal-tar products entered for consumption, 1917 to 1920*—Con.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND)—Continued.

Article and years.	Quantity.	Value.	Duty.	Actual and computed ad-valorem rate.
colors, dyes or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.—Continued.				
Carbazol, purity of 25 per cent or more—	*Pounds.*			*Per cent.*
1917				
1918				
1919				
1920	157	$27	$8	29.56
Dimethylaniline—				
1917				
1918				
1919	1,120	427	92	21.56
1920	22,400	15,968	2,955	18.51
Metacresol, orthocresol, and paracresol, purity of 90 per cent or more—				
1917				
1918				
1919				
1920	2,444	2,230	396	17.74
Methylanthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
Naphthalene solidifying at 79° C. or above—				
1917	267,057	12,125	8,497	70.02
1918	2,795	171	96	55.87
1919	7,650	384	249	64.80
1920	3,697,562	416,172	154,865	37.21
Naphthol—				
1917	1,027	1,069	186	17.40
1918				
1919				
1920				
Naphthylamine—				
1917				
1918	11,761	5,985	1,192	19.91
1919				
1920	69,695	7,208	2,824	39.18
Nitrobenzol—				
1917				
1918				
1919	21,513	4,003	1,138	28.44
1920	45,891	6,009	2,049	34.09
Nitronaphthalene—				
1917	18,102	7,758	1,616	20.83
1918				
1919				
1920				
Nitrotoluol—				
1917				
1918				
1919	542	452	81	18.00
1920	684	359	71	19.76
Phenylenediamine—				
1917				
1918				
1919	2,746	1,769	334	18.88
1920	2,429	1,887	344	18.22
Phthalic anhydride—				
1917	98	1,853	280	15.13
1918				
1919				
1920				
Resorcin—				
1917	134	672	104	15.50
1918				
1919				
1920	51,529	39,982	7,278	18.23
Xylidine—				
1917				
1918				
1919				
1920	56,047	41,237	7,587	18.40

TABLE 19.—*Imports of coal-tar products entered for consumption, 1917 to 1920—C*

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND)—Continued

Article and years.	Quantity.	Value.	Duty.	Act and c pute vale ra
All distillates, n. s. p. f., which on distillation yield in the portion distilling below 200° C. a quantity of tar acid equal to or more than 5 per cent of the original distillate:	*Pounds.*			*Per*
1917				
1918	1,550	$2,008	$340	
1919	3,170	4,587	767	
1920	85,474	36,041	7,543	
All similar products, obtained, derived, or manufactured in whole or in part from the products provided for in Group I (free):				
1917	193,021	17,595	7,465	
1918	13,445	8,640	1,632	
1919	51,214	30,861	7,260	
1920	87,911	74,514	13,375	
All sulfoacids or sulfoacid salts of Group II:				
1917				
1918				
1919				
1920	100	87	16	

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM).

When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives:				
Alizarin, natural—	*Pounds.*			*Per*
1917	6,899	$12,216	$3,665.00	
1918	108,711	158,316	47,644.80	
1919	6,684	8,612	2,583.60	
1920	58,583	41,381	12,414.30	
Alizarin, synthetic—				
1917	19,180	55,179	16,554.00	
1918				
1919				
1920	73,232	24,072	7,221.60	
Dyes obtained, derived, or manufactured from alizarin—				
1917	34	75	22.50	
1918	6,446	13,399	4,019.70	
1919	1,920	3,864	1,159.20	
1920	29,436	25,489	7,646.70	
Dyes obtained, derived, or manufactured from anthracene and carbazol—				
1917	23,146	11,326	3,398.00	
1918	12,827	20,087	6,026.10	
1919	7,162	7,772	2,331.60	
1920	216,508	208,754	62,626.20	
Indigoids, whether or not obtained from indigo—				
1917	129,983	140,932	42,280.00	
1918	3,376	13,744	4,123.20	
1919	34,049	82,779	24,833.70	
1920	86,439	196,783	59,034.90	
Flavors—				
1917	35	408	122.60	
1918	160	816	244.80	
1919				
1920	14	27	8.10	
Indigo, natural—				
1917	2,261,122	4,230,510	1,269,153.60	
1918	1,637,914	2,007,958	602,387.40	
1919	234,991	285,925	85,777.50	
1920	36,537	69,528	20,858.40	
Indigo, synthetic—				
1917	1,379,349	871,267	261,380.00	
1918	690,414	342,589	102,776.70	
1919	537,697	327,133	98,139.90	
1920	171,101	207,299	62,189.70	
Medicinals—				
1917		284,346	85,304.00	
1918		301,074	90,322.20	
1919		168,466	50,539.80	
1920		165,055	49,516.50	

9.—*Imports of coal-tar products entered for consumption, 1917 to 1920*—Con.

› III (DUTIABLE AT 30 PER CENT AD VALOREM PLUS 5 CENTS PER POUND).

Article and years.	Quantity.	Value.	Duty.	Actual and computed ad-valorem rate.
ined, derived, or manufactured in whole or in t any of the products provided for in Group I II, including natural indigo and their deriva-				
or color lakes obtained, derived, or manufac- from alizarin—	*Pounds.*			*Per cent.*
7	7,062	$18,680	$5,957.00	31.89
8	1,499	4,490	1,421.95	31.67
9	15,358	14,405	5,089.40	35.33
0	98,735	172,841	56,789.05	32.86
or color lakes obtained, derived, or manufac- from anthracene and carbazol—				
7	53,205	49,729	17,579.00	35.35
8	27,900	22,546	8,158.80	33.19
9	38,073	55,475	18,546.15	33.43
0	260,060	529,966	171,992.80	32.45
er colors, dyes, or stains, whether soluble or n water, color acids, color bases, or color lakes—				
7	2,257,476	2,574,363	885,183.00	34.38
8	1,799,467	2,161,799	738,513.05	34.16
9	1,991,687	2,848,294	954,072.55	33.50
0	2,807,807	4,093,389	1,368,407.05	33.43
ic resin, synthetic—				
7	134,702	11,596	10,214.00	88.08
8				
9	1,114	2,860	913.70	31.95
0	2,479	2,681	928.25	34.63
raphic chemicals—				
7	12,632	101,406	31,053.00	30.62
8	14,550	108,537	33,288.60	30.67
9	12,059	77,876	23,985.75	30.77
0	21,808	67,640	21,392.40	31.61
(25 per cent), 1919	124	50	12.00	25.00
tidin (25 per cent):				
	3,280	40,352	10,088.00	25.00
ylic acid (25 per cent):				
	1,474	4,670	1,168.00	25.00
	26	76	19.00	25.00
› (25 per cent):				
	21,842	62,411	15,603.00	25.00
	9,416	106,643	26,661.00	25.00
	13,736	135,565	33,891.00	25.00
	14,737	53,293	13,323.00	25.00
5 per cent)				
er cent)				
halein (25 per cent):				
	100	1,200	300.00	25.00
	200	726	181.00	25.00
65 cents per pound):				
	554	6,544	360.00	5.50

x include 110 pounds, valued at $322, duty $81.68, from Cuba.
d under acetylsalicylic acid.
le under the act of Oct. 3, 1913, rather than under the act of Sept. 8, 1916.

TABLE 19.—*Imports of natural dyes and extracts of, entered for consumption, 1917 to 1*

Calendar year.	Annatto.		Cochineal.		Cudbear.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Val
	Pounds.		*Pounds.*		*Pounds.*	
1917	660,102	$77,238	121,879	$48,345	55,897	
1918	655,250	62,961	237,402	116,660	54,447	
1919	356,432	19,972	116,014	52,029	33,391	
1920	1,004,129	40,108	202,808	81,979	50,170	

Calendar year.	Dyewoods, diverse.		Fustic wood.		Indigo, natur	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Va
	Tons.		*Tons.*		*Pounds.*	
1917	7,565	304,029	10,442	$289,756	2,361,122	$4,
1918	15,966	407,190	11,866	280,513	1,637,914	2,
1919	922	23,286	696	15,091	234,991	
1920	2,653	51,904	1,304	25,033	36,537	

Calendar year.	Logwood.		Logwood (and other wood extracts).		Madder, grou	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Va
	Tons.		*Pounds.*		*Pounds.*	
1917	61,714	$1,509,878	736,038	$95,672	2,198	
1918	33,168	776,735	277,748	45,895		
1919	20,022	549,885	539,252	62,601	7,878	
1920	72,830	2,179,891	545,892	50,313	12,835 [1] 2,300	

Calendar year.	Orchil.		Persian berries, extract.		Safflower, and	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Va
	Pounds.		*Pounds.*		*Pounds.*	
1917		$50,005				$
1918		56,284				
1919	372,606	42,085	5,209	$2,691	23,663	
1920	547,384	58,682	11,357	3,631	21,664	

Calendar year.	Turmeric.		Gambier.		All other extra vegetable orig	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Va
	Pounds.		*Pounds.*		*Pounds.*	
1917		$1,331	12,050,848	$1,138,833	150,078	
1918		11,278	8,755,270	949,971	2,889,865	
1919	1,230,229	68,852	4,744,651	432,499	443,749	
1920	1,215,057	86,141	10,095,325	896,583	381,537	

[1] Extracts of madder, 1920.

20.—General imports of coal-tar products, by countries, 1918–1920, calendar years.

DEAD OR CREOSOTE OIL (FREE).

nported from—	1918		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Gallons.		*Gallons.*		*Gallons.*	
			8,934,045	$1,085,617	12,514,150	$2,568,235
	1,125	$862	60,756	10,462	147,377	21,096
	1,543,660	161,693	2,273,578	278,138	1,619,903	227,624
	462	314			[1] 4,145,722	979,444
tal	1,545,247	162,869	11,268,379	1,374,217	18,427,152	3,796,399

BENZOL.

	Pounds.		*Pounds.*		*Pounds.*	
	1,315,696	$33,303	217,865	$5,617	496,619	$10,868

CRESOL.

	Pounds.		*Pounds.*		*Pounds.*	
	3,051,833	$256,917	4,935,748	$408,407	6,037,223	$509,710
	1,676,354	196,116	1,516,610	149,373	4,198,397	382,637
			800	1,028	16,400	1,360
					66,050	7,674
tal	4,728,187	453,033	6,453,158	558,808	10,318,070	901,381

NAPHTHALENE.

	Pounds.		*Pounds.*		*Pounds.*	
ingdom	424,147	$13,253	1,342,091	$47,076	10,155,579	$357,954
					413,274	16,972
	1,328,496	44,540	1,836,478	43,795	2,959,976	78,704
					331,740	34,135
			612	42	98,695	7,653
					494,644	17,077
			60,075	1,352	168,923	3,528
					339,340	14,198
tal	1,752,643	57,793	3,239,256	92,265	15,012,171	530,221

TAR AND PITCH OF COAL.

	Barrels.		*Barrels.*		*Barrels.*	
	51	$686	600	$2,725	1,127	$4,166
			100	256	580	3,706
	23,499	49,069	25,003	44,093	18,824	41,940
					150	350
tal	23,550	49,755	25,703	47,074	20,681	50,162

TOLUOL.

	Pounds.		*Pounds.*		*Pounds.*	
			1,195,706	$30,768		

ALL OTHER CRUDES.

		$823		$54		$10,993
l		57,364		42,875		178,896
l		825		870		1,581
		104,765		1,891		876
y						9,179
r						2,886
otal		163,777		45,690		204,381

[1] From Netherlands, except 6 gallons from Japan.

TABLE 20.—*General imports of coal-tar products, by countries, 1918–1920, calendar years*—Continued.

CARBOLIC ACID.

Imported from—	1918				1919	
	Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, free.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
England	155,236	$17,260	208,037	$54,884	1,619,823	$133,6[illegible]
Canada			75,300	7,613		
Scotland					345,466	29,[illegible]
Total	155,236	17,260	283,337	62,497	1,965,289	187,7[illegible]

Imported from—	1919		1920			
	Carbolic acid, dutiable (phenol).		Carbolic acid, free.		Carbolic acid dutiable (phenol).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
England	2,061	$264	178,652	$18,258	1,040	$264
Scotland			14,040	1,590		
Total	2,061	264	192,692	19,848	1,040	26[illegible]

ALL OTHER ACIDS.

Imported from—	1918		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
England	125	$1,114	63	$374	250	$1,087
Japan	5	2				
France					11,199	8,182
Germany					309	509
Total	130	1,116	63	374	11,758	9,778

ANILIN OIL.

Imported from—	1918		1919		1920	
					Pounds.	
France					220	$72

ANILIN SALTS.

(Free under act of 1909; dutiable under act of Oct. 3, 1913, and under the act of Sept. 8, 1916.)

Imported from—	1918		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
England	21,273	$3,250				
Germany					4	$1
Total	21,273	3,250			4	1

E 20.—*General imports of coal-tar products, by countries, 1918–1920, calendar years*—Continued.

ALL OTHER INTERMEDIATES.

Imported from—	1918	1919	1920
m			$41,291
		$26,611	140,085
ny			191,752
			17,491
nd	$15	48,722	302,235
Settlements			41,237
	4,348	82	68,323
a		20,788	
ier			29,264
Total	4,363	96,203	831,068

INDIGO.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918				1919	
	Indigo, natural (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
erland	25,762	$38,719	770,212	$410,421	15,796	$29,857
nd	234,975	463,510	6,817	5,587	10,584	16,647
n India	1,138,176	1,284,434			99,597	99,901
dor	234,452	299,554			60,940	67,262
ier	83,709	108,150			40,557	46,448
Total	1,747,074	2,194,367	777,029	416,008	227,474	260,115

Imported from—	1919		1920			
	Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
erland	726,440	$388,067	57,411	$150,957	295,153	$252,708
nd	1,468	1,970	27,269	51,556	1,229	361
dor	8,400	5,729	10,214	20,206		
			50,066	70,008	490,589	172,692
ny			4,346	5,171	25,029	18,220	
			2,850	7,392		
					54,422	37,311
ier	87,570	36,607	48	48		
Total	823,878	432,373	152,204	305,428	766,422	481,292

TABLE 20.—*General imports of coal-tar products, by countries, 1918–1920, cal years*—Continued.

ALIZARIN AND ALIZARIN DYES.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Va
	Pounds.		*Pounds.*		*Pounds.*	
Germany					141,213	$
Switzerland	440	$572	220	$2,517	222,417	
United Kingdom	4,310	3,739	23,417	21,084	25,198	
Canada	1	2	215	414	297	
Japan	15,141	58,948				
Belgium					46,253	
Netherlands					5,906	
All other	500	7,629	23	265	444	
Total	20,392	70,890	23,875	24,280	441,756	

COAL-TAR COLORS OR DYES (DUTIABLE).

Imported from—	1918, value.	1919		1920	
		Quantity.	Value.	Quantity.	Va
		Pounds.		*Pounds.*	
Belgium		36,968	$63,119	190,414	$
France	$76,506	11,746	20,853	70,821	
Germany		143,081	83,563	1,155,561	1,
Switzerland	1,762,668	1,284,199	2,176,463	1,372,489	2,
England	561,699	699,703	664,546	345,889	
All other	68,546	165,750	160,730	351,788	
Total	2,409,439	2,215,397	3,169,276	3,486,873	5,

ALL OTHER COAL-TAR PRODUCTS.

Imported from—	1918 [1]	1919	
France	$11,900		
Netherlands	50		
Switzerland	3,045		
England	47,548		
Mexico	32		
Total	62,575		

[1] Jan. 1–June 30, 1918.

MEDICINAL PREPARATIONS.

Imported from—	1918 [2]	1919	
France	$32,129	$58,749	
Germany			
Italy		1,329	
Netherlands		12,257	
Spain		94	
Switzerland	154	1,761	
England	7,499	20,302	
Scotland		137	
Canada	53,324	77,162	
Peru	114		
Venezuela		69	
Japan	6,142	351	
All other	10		
Total	99,372	172,211	

[2] July 1–Dec. 31, 1918.

E 20.—*General imports of coal-tar products by countries, 1918–1920, calendar years*—Continued.

ALL OTHER FINISHED PRODUCTS.

Imported from—	1918[1]	1919	1920
	$4,162	$25,955	$37,192
ny			21,406
rland	2,901	1,447	6,715
id	54,502	57,166	10,307
	816		
er			29
Total	62,381	84,568	75,649

r 1–Dec. 31, 1918.

E 21.—*Domestic exports of coal tar and of dyes and dyestuffs, 1918–1920, calendar years.*

COAL TAR.

Exported to—	1918		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		*Barrels.*		*Barrels.*	
e	2,069	$12,297	230	$900	243	$1,441
America	54,149	139,456	71,749	158,205	74,374	208,561
America	808	6,288	2,759	20,166	3,725	23,656
	198	1,505	475	3,174	10	65
a	154	1,739	45	301	81	995
	1,176	7,435	1,334	15,757	17	49
Total	58,554	168,720	76,592	198,503	88,350	234,767

COAL-TAR DISTILLATES, n. e. s.

BENZOL.

	Pounds.		*Pounds.*		*Pounds.*	
e	32,599,682	$1,854,216	12,319,900	$407,622	2,528,494	$138,850
					229,079	16,760
nd			113,300	10,197	57,500	4,970
any					669,494	36,902
da	136,571	7,389	335,799	21,313	389,783	23,904
ium					3,150,240	238,617
atina	75,442	7,329	973,978	60,563	353,522	23,907
n	136,480	8,680	280,442	18,590	67,200	6,720
	299,659	22,704			4,961,878	357,956
ther	46,743	4,042	215,000	16,847	767,078	79,354
Total	33,294,577	1,904,360	14,238,419	535,132	13,174,268	927,940

ALL OTHER COAL-TAR DISTILLATES.

Exported to—	1918	1919	1920
	Value.	Value.	Value.
ce	$2,188,439	$33,387	$445,520
ium			474,793
y	345,407	14,674	290,449
land	927,295	127,583	1,632,599
ada	1,477,984	105,335	314,641
in	96,798	64,917	615,284
co	78,160	61,441	136,063
il	72,162	101,305	193,089
n	475,377	250,061	1,158,196
herland	46,831	8,144	1,632,599
other	159,377	336,903	69,016
Total	5,867,830	1,103,750	6,962,249

TABLE 21—*Domestic exports of coal tar and of dyes and dye dyestuffs, 1918–1920*—Continued.

DYES AND DYESTUFFS (VALUE).

Exported to—	Calendar years.					
	1918			1919		
	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.
Portugal	$176,709	$10,541	$131,280	$70,296	$2,319	$36,[illegible]
Belgium				90	34,787	19,[illegible]
France	6,345	263,610	496,875	127,059	596,042	228,[illegible]
Germany				150	290	
Italy	274,903	70,287	234,238	269,130	58,716	180,[illegible]
Netherlands				26,284	21,735	9,[illegible]
Russia			12,825	8,570		
Switzerland	22,500	7,728	5,000	193	22,824	
United Kingdom	380,181	345,458	524,576	413,700	304,646	423,719
Canada	836,445	82,292	724,522	1,015,334	119,871	1,007,882
Mexico	289,327	5,666	181,029	467,806	17,438	230,339
Central America	5,617	400	5,498	5,941	802	14,546
West Indies	23,447	742	35,473	34,307	137	40,[illegible]
South America	1,719,408	128,645	931,600	1,651,872	66,099	585,127
Asia	4,248,367	504,542	2,720,399	5,565,053	48,053	1,921,[illegible]
Oceania	100,490	20,194	133,493	177,954	14,041	143,[illegible]
Africa	3,993	715	15,534	45,566	1,508	5,[illegible]
Denmark			1,055	5,334	9,671	2,[illegible]
Spain	518,895	104,748	472,222	535,383	18,349	86,[illegible]
Sweden				22,694	8,584	15,[illegible]
Norway		986	4,529	13,663	1,300	7,[illegible]
All other	22,924	4,877	6,761	267,682	8,584	44,[illegible]
Total	8,629,611	1,551,380	6,636,099	10,724,071	1,355,936	5,094,[illegible]

Exported to—	1920		
	Aniline dyes.	Logwood extracts.	All other.
Portugal	$66,752	$5,970	$30,[illegible]
Belgium	507,371	118,339	41,[illegible]
France	807,241	607,017	391,060
Germany	454	1,456	7,745
Italy	582,236	404,367	275,149
Netherlands	39,682	73,472	56,057
Russia (European)	100		
Switzerland	132,359	60,157	92,017
United Kingdom	1,318,498	729,026	1,079,871
Canada	1,547,109	183,061	982,065
Mexico	1,091,603	11,092	210,145
Central America	13,159	1,852	13,739
West Indies	52,745	18,144	97,922
South America	2,282,210	45,586	497,029
Asia	12,783,303	195,493	3,208,107
Oceania	277,660	41,283	134,196
Africa	65,077	1,248	28,251
Denmark	26,463	2,903	2,794
Spain	682,998	77,183	149,365
Sweden	67,921	1,250	29,802
Norway	4,568	1,110	15,998
All other	100,971	25,051	38,997
Total	22,450,480	2,605,060	7,373,111

TABLE 22.—*Imports and exports of inks and ink powders, 1918–1920, calendar years.*

IMPORTS FOR CONSUMPTION.

Calendar year.	Printer's ink.			Writing and copying ink.			All other, including ink powders.		
	Rate of duty.	Value.	Duty collected.	Rate of duty.	Value.	Duty collected.	Rate of duty.	Value.	Duty collected.
	Per cent.			*Per cent.*			*Per cent.*		
1918	15	$4,154	$623	15	$13,363	$2,004	15	$6,343	$951
1919	15	199	30	15	15,116	2,267	15	8,143	1,221
1920	15	15,228	2,284	15	15,505	2,326	15	10,657	1,599

DOMESTIC EXPORTS.

Exported to—	Calendar years.					
	1918		1919		1920	
	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.
Europe	$48,394	$25,371	$210,482	$68,382	$224,129	$96,699
North America	256,507	206,360	320,008	297,959	366,784	328,889
South America	303,023	100,833	603,758	210,212	535,265	208,272
Asia	224,345	67,736	435,664	155,420	579,843	187,988
Oceania	116,424	42,452	113,288	109,962	171,640	105,984
Africa	42,189	5,429	29,726	14,282	15,091	8,887
Total	1,040,882	448,181	1,712,926	856,217	1,892,752	936,719

DIRECTORY OF MANUFACTURERS OF COAL-TAR PRODUCTS DURING 1920.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
1	Abbott Laboratories, The	4753 Ravenswood Avenue, Chicago, Ill.
2	Advance Color Corporation	833 Magnolia Avenue, Elizabeth, N. J.
3	Agawam Chemical Works (Inc.)	531 Grosvenor Building, Providence, R. I. (North Attleboro, Mass.).
4	Albany Chemical Co	2-24 Broadway, Albany, N. Y.
5	Alston-Lucas Paint Co	Wade and Currier Streets, Chicago, Ill.
6	Althouse Chemical Co. (Inc.)	540 Pear Street, Reading, Pa.
7	Amalgamated Dyestuff & Chemical Works (Inc.).	75 Hudson Street, New York City (Newark, N. J.).
8	American Aniline Products (Inc.)	80 Fifth Avenue, New York City (Lock Haven, Pa.).
9	American Chemical Products Co	73 Chatham Street, Rochester, N. Y.
10	American Nitration Co. (Inc.)	River Road, Nutley, N. J.
11	Ansbacher & Co., A. B. (Inc.)	527 Fifth Avenue, New York City (Brooklyn, N. Y.).
12	Anthrakone Dye Products & Chemical Co. (Inc.).	14-16 Hopkins Street, Brooklyn, N. Y. (Kenilworth, N. J.).
13	Arista Chemical Co. (Inc.)	305 Broadway, New York City (Brooklyn, N. Y.).
14	Atlantic Dyestuff Co	88 Ames Building, Boston, Mass. (Burrage, Mass.; Portsmouth, N. H.).
15	Atlas Color Works (Inc.)	322 Ninth Street, Brooklyn, N. Y.
16	Barrett Co., The	17 Battery Place, New York City (plants distributed throughout the United States).
17	Beaver Chemical Co. (Inc.)	108 Wall Street, New York City (Damascus, Va.).
18	Beaver Manufacturing Co	Ballardvale, Mass.
19	British-American Chemical Corporation of New Jersey.	109 Beekman Street, New York City (Ridgefield Park, N. J.).
20	Brooklyn Color Works (Inc.)	601-3-5 Sackett Street, Brooklyn, N. Y.
21	Buffalo Specialty Co	375 Ellicott Street, Buffalo, N. Y.
22	Butterworth Judson Corporation	61 Broadway, New York City (Newark, N. J.).
23	Calco Chemical Co., The	Bound Brook, N. J. (Bound Brook, Burlington, Newark, Jersey City, and Woodbridge, N. J.).
24	Carey Manufacturing Co., The Philip	Lockland, Ohio.
25	Central Dyestuffs & Chemical Co	Plum Point Lane, Newark, N. J.
26	Certainteed Products Corporation	1801 Boatmen's Bank Building, St. Louis, Mo. (East St. Louis).
27	Certified Chemical Corporation	80 Maiden Lane, New York City (246 Plymouth Street, Brooklyn, N. Y.).
28	Charleston Chemical Co	Charleston, W. Va., Box 1362 (Belle, W. Va.).
29	Chatfield Manufacturing Co., The	Seventy-fourth and Lebanon Streets, Cincinnati, Ohio.
30	The Chemical Co. of America (Inc.)	40 Murray Street, New York City (Springfield, N. J.).
31	Childs & Co. (Inc.), Charles M	43 Summit Street, Brooklyn, N. Y.
32	Chiris Co., Antoine	20 Platt Street, New York City (Delawanna and Bayonne, N. J.).
33	Cincinnati Chemical Works (Inc.)	Evanston Station, Cincinnati, Ohio (Norwood and St. Bernard, Ohio).
34	Commonwealth Chemical Corporation	15 Park Row, New York City (Newark, N. Y., Wayne, Co.).
35	Commonwealth Color & Chemical Co	Butler, Nevins, and Baltic Streets, Brooklyn, N. Y.
36	Condensite Co. of America	Bloomfield, N. J. (Wyandotte, Mich.)
37	Connecticut Metal & Chemical Co., The	New Britain, Conn. (East Berlin, Conn.).
38	Consolidated Color & Chemical Co	122 Hudson Street, New York City (Newark, N. J.).
39	Cooks Falls Dye Works (Inc.)	80 Maiden Lane, New York City (Cooks Falls, N. Y.).
40	Coopers Creek Chemical Co	West Conshohocken, Pa.
41	Corona Chemical Co	Milwaukee, Wis.
42	Crescent Color & Chemical Works (Inc.)	Eleventh Avenue and Fifty-ninth Street, New York City (Dunellen, N. J.).
43	Croton Color & Chemical Co. (Inc.)	295 Broadway, New York City (Croton-on-Hudson, N. Y.).
44	Cumberland Chemical Corporation	Bristol, Va.
45	Davis Chemical Products (Inc.)	Elizabeth, N. J., Box 95 (Union Township, N. J.).
46	Denver Gas & Electric Light Co., The	900 Fifteenth Street, Denver, Colo.
47	Dermatological Research Laboratories	1720 Lombard Street, Philadelphia, Pa.
48	Devoe & Reynolds Co. (Inc.)	101 Fulton Street, New York City (New York and Chicago).
49	Dicks David Co. (Inc.)	Varick and North Moore Streets, New York City (Chicago Heights, Ill.).
50	Dow Chemical Co., The	Midland, Mich.
51	Du Pont de Nemours & Co., E. I	Wilmington, Del. (Deepwater Point and Lodi, N. J.).
52	Dye Products & Chemical Co. (Inc.)	200 Fifth Avenue, New York City (Newark, N. J.)
53	Eakins (Inc.), J. S. & W. R	24 Wallabout Street, Brooklyn, N. Y.
54	Eastman Kodak Co	Kodak Park Works, Rochester, N. Y.
55	Essex Aniline Works (Inc.)	88 Broad Street, Boston, Mass. (South Middleton, Mass.).

Directory of manufacturers of coal-tar products during 1920—Continued.

Name of company.	Office address (location of plant given in parentheses if not in same city as office).
Fine Colors Co., (Inc.)	21-29 McBride Avenue, Paterson, N. J.
Fiorasynth Laboratories (Inc.)	Unionport, N. Y.
Fries Bros.	92 Reade Street, New York City (Bloomfield, N. J.).
Garfield Aniline Works (Inc.)	Garfield, N. J.
Gary Chemical Co.	738 Broadway, Chesterton, Ind.
Gaskill Chemical Corporation	157 Spencer Street, Brooklyn, N. Y.
General Bakelite Co.	2 Rector Street, New York City (Perth Amboy, N. J.)
Goodyear Tire & Rubber Co.	Akron, Ohio.
Grasselli Chemical Co., The	Cleveland, Ohio, Guardian Building (Grasselli, N. J. and Rensselaer, N. Y.).
Hartmann-de-Laire-Schaefer Co.	Maywood, N. J.
Heath Manufacturing Co.	2301 North Eleventh Street, St. Louis, Mo.
Helena Light & Railway Co.	Helena, Mont.
Heller & Merz Co.	338 Wilson Avenue, Newark, N. J.
Hermann & Co., Morris	200 Fifth Avenue, New York City (Newark, N. J.).
Heyden Chemical Co. of America (Inc.)	Garfield, N. J.
Heyl Laboratories (Inc.)	437 Barretto Street, New York City.
Hind Harrison Plush Co., The	Clark Mills, N. Y.
Hirsch Laboratories (Inc.)	50 East Forty-first Street, New York City (Brooklyn, N. Y.).
Holland Aniline Co.	Holland, Mich.
Holliday-Kemp Co. (Inc.)	Betts Avenue and Queens Boulevard, Woodside, Long Island, N. Y.
Hooker Electro Chemical Co.	25 Pine Street, New York City (Echota, Niagara Falls, N. Y.).
Hord Color Products Co., The	1636 Columbus Avenue, Sandusky, Ohio.
Hub Dyestuff & Chemical Co.	595 East Seventh Street, South Boston, Mass.
Hydrocarbon Chemical Co.	951 East Orange Street, Lancaster, Pa.
Hynson, Westcott & Dunning	423 North Charles Street, Baltimore, Md.
Imperial Color Works (Inc.)	Glens Falls, N. Y.
Independent Coal Tar Co.	26 Broad Street, Boston, Mass. (Taunton, Mass.).
Industrial Chemical Co.	Providence, R. I., Box 1288 (East Providence, R. I.).
International Coal Products Corporation	511 Fifth Avenue, New York City (Irvington, N. J.).
International Consolidated Chemical Corporation.	11 East Thirty-sixth Street, New York City (Long Island City, N. Y.)
Interstate Products Corporation	Bristol, Tenn. (Avoca, Tenn.).
Jonecke-Ault Co.	Avenue B and Wright Street, Newark, N. J.
Kart Synthetic Products Co.	241 East Illinois Street, Chicago, Ill.
Kentucky Color & Chemical Co.	Thirty-fourth Street, south of Bank Street, Louisville, Ky.
Kettle River Co., The	Madison, Ill.
Klipstein & Sons Co., E. C.	644 Greenwich Street, New York City (South Charleston, W. Va.).
Kohnstamm & Co., H.	87 Park Place, New York City (Brooklyn, N. Y.).
Lamie Chemical Co.	Twenty-first Street and Baltimore & Ohio R. R., Huntington, W. Va.
Lauber & Co., F. G. (Inc.)	104 Grove Street, Brooklyn, N. Y.
Lawrence Color & Chemical Works	15 Merrimac Street, Lawrence, Mass.
Lee & Co., A.	Lawrence, Mass. (Methuen, Mass.).
Lewis Manufacturing Co., F. J.	2513 South Robey Street, Chicago, Ill.
Lindsay Light Co.	161 East Grand Avenue, Chicago, Ill.
McKesson & Robbins (Inc.)	91 Fulton Street, New York City (Brooklyn, N. Y.).
Mallinckrodt Chemical Works	3600 North Second Street, St. Louis, Mo.
Marietta Refining Co., The	Marietta, Ohio.
Max Marx Color & Chemical Co.	192 Coit Street, Irvington, N. J.
Massachusetts State Department of Health.	340 State House, Boston, Mass.
May Chemical Works	204 Niagara Street, Newark, N. J.
Merck & Co.	45 Park Place, New York City (Rahway, N. J.).
Merrimac Chemical Co.	148 State Street, Boston, Mass. (North Woburn, Mass.).
Metz Laboratories (Inc.), H. A.	122 Hudson Street, New York City (Brooklyn, N. Y.).
Monroe Drug Co.	Fourth and Oak Streets, Quincy, Ill.
Monsanto Chemical Works	1724 South Second Street, St. Louis, Mo.
National Ammonia Co. of Pennsylvania	Delaware and Vankirk Streets, Frankford, Philadelphia, Pa.
National Aniline & Chemical Co. (Inc.)	21 Burling Slip, New York City (Buffalo, N. Y.; Marcus Hook, Pa.; Brooklyn, N. Y.).
Naugatuck Chemical Co., The	Naugatuck, Conn.
New England Aniline Works (Inc.)	93-95 Broad Street, Boston, Mass. (Ashland, Mass.).
New England Chemical Co. (Inc.)	143 Federal St., Boston, Mass. (North Billerica, Mass.).
New Haven Gas Light Co.	80 Crown Street, New Haven, Conn.
Newport Chemical Works (Inc.)	First Wisconsin National Bank, Milwaukee, Wis. (Passaic, N. J., and Carrollville, Wis.; Bay Minette, Ala. Pensacola, Fla.).
New York Color & Chemical Co. (Inc.)	98 John Street, New York City (Philadelphia, Pa.).
Niagara Alkali Co.	4205 Buffalo Avenue, Niagara Falls, N. Y.
Nitro Powder Co., The	50 Broad Street, New York City (Kingston, N. Y.).
Nitro Products Co.	401 Eddy Building, Saginaw, Mich.
Nitro Products Corporation	Nitro, W. Va.
Noil Chemical & Color Co. (Inc.)	152 West One hundred and eighth Street, New York City.

Directory of manufacturers of coal-tar products during 1920—Continued.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
124	Organic Products Corporation	301 Liberty Street, Schenectady, N. Y.
125	Organic Salt & Acid Co. (Inc.)	Borden and Van Alst Avenues, Long Island City, N. Y. (Newark, N. J.).
126	Palatine Aniline & Chemical Corporation	176 Purchase Street, Boston, Mass. (Poughkeepsie, N. Y.).
127	Peerless Color Co. (Inc.)	Bound Brook, N. J.
128	Pharma Chemical Corporation	233 Broadway, New York City (Bayonne, N. J.).
129	Po Ambo Chemical Co.	Matawan, N. J.
130	Radiant Dye & Color Works	2837 West Twenty-first Street, Brooklyn, N. Y.
131	Raritan Aniline Works, The	New Brunswick, N. J.
132	Redmanol Chemical Products Co.	636 West Twenty-Second Street, Chicago, Ill.
133	Reliance Aniline & Chemical Co. (Inc.)	15 William Street, New York City (Poughkeepsie, N. Y.).
134	Republic Color & Chemical Works	Sixth and Richmond Streets, Reading, Pa.
135	Republic Creosoting Co.	1614 Merchants Bank Building, Indianapolis, Ind. (St. Louis Park, Minn.; Seattle, Wash.; Mobile, Ala.).
136	Rhodia Chemical Co.	89 Fulton Street, New York City (New Brunswick, N. J.)
137	Rollin Chemical Corporation	Charleston, W. Va., (South Charleston, W. Va.).
138	Ruxton (Inc.), Philip	220 West Forty-second Street, New York City, (Brooklyn, N. Y.).
139	Semet-Solvay Co.	Syracuse, N. Y.
140	Seydel Manufacturing Co.	78-100 Forest Street, Jersey City, N. J.
141	Sherwin-Williams Co., The	Cleveland, O. (Kensington, Chicago, Ill.).
142	Siegle Corp. of America, G.	80 Fifth Avenue, New York City (Rose Bank, Staten Island, N. Y.).
143	Siemon & Elting	93 Nassau Street, New York City (Irvington, N. J.)
144	Sinclair & Valentine Co.	611 West One Hundred and Twenty-ninth Street, New York City (Edgewater, N. J.).
145	Special Materials Co. (Inc.)	140 Livingston Street, Brooklyn, N. Y.
146	Staler Chemical Co.	81 Fulton Street, New York City (Newark, N. J.).
147	Standard Chemical Co.	Twenty-second and Dock Streets, Tacoma, Wash.
148	Sun Color & Chemical Co.	309 Sussex Street, Harrison, N. J.
149	Synfleur Scientific Laboratories	Monticello, N. Y.
150	Synthetical Laboratories of Chicago	1325 West Congress Street, Chicago, Ill.
151	Tar Products Corporation	913 Turks Head Building, Providence, R. I. (East Providence, R. I.).
152	Texdel Chemical Co. (Inc.)	168 Water Street, New York City (Jersey City, N. J.).
153	T. M. & G. Chemical Co. (Inc.)	517 Cortlandt Street, Belleville, N. J.
154	Tower Mfg. Co. (Inc.)	552 Pearl Street, New York City (Brooklyn, N. Y. and Newark, N. J.).
155	Transatlantic Chemical Corporation	Linden, N. J.
156	Trico Chemical Co. (Inc.)	502 Iroquois Building, Buffalo, N. Y.
157	Ullman, Sigmund	Park Avenue and One Hundred and Forty-sixth Street, New York City.
158	Ultro Chemical Corporation	41 Union Square, New York City.
159	Universal Aniline Dyes & Chemical Co.	1010 Wells Building, Milwaukee, Wis. (South Milwaukee, Wis.).
160	University of Illinois	Urbana, Ill.
161	Van Dyk & Co.	4 Platt Street, New York City (Jersey City, N. J.).
162	Verona Chemical Co.	26 Verona Avenue, Newark, N. J.
163	Warner-Jenkinson Co.	2526 Baldwin Street, St. Louis, Mo.
164	Washington Dye & Chemical Corporation	312 Davidson Building, Washington, D. C. (Alexandria, Va.).
165	Western Dry Color Co.	Fifty-second and Wallace Streets, Chicago, Ill.
166	White Tar Co. of N. J. (Inc.)	56 Vesey Street, New York City (Kearney, N. J.).
167	Wilbur White Chemical Co., The	Owego, N. Y.
168	Wilhelm Co., The A.	Third and Bern Streets, Reading, Pa.
169	Williamsburg Chemical Co. (Inc.)	61 Broadway, New York City (Brooklyn, N. Y.).
170	Wolf & Co., Jacques	Lexington Avenue and Center Street, Passaic, N. J. (Clifton, N. J.).
171	Zinsser & Co. (Inc.)	Hastings-on-Hudson, N. Y.

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WASHINGTON

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Production Costs in the Lithopone Industry

First Six Months of 1921

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INTRODUCTION.

This pamphlet is a survey and compilation of costs of production in the lithopone industry during the first six months of 1921. The Tariff Commission in a previous report—Barytes, Barium Chemical and Lithopone Industries, Including Costs of Production, 1919—compiled costs of production in this industry for the calendar year 1919.

The present report gives in tabular form the cost of production of lithopone by individual companies, and shows in detail the various items of expense which make up the total cost. In addition, the costs previously reported to the commission for 1919 are shown along with those for the first six months of 1921, for convenience in comparison. The pamphlet contains a discussion of conditions in the lithopone industry during the first half of 1921 and a detailed discussion of the cost tables.

In the preparation of this report the Tariff Commission had the services of C. R. DeLong, of the Chemical Division, and E. M. Whitcomb, of the Accounting Division, of the commission's staff, and of others.

PRODUCTION COSTS IN THE LITHOPONE INDUSTRY, FIRST SIX MONTHS OF 1921.

The Tariff Commission was requested by a committee representing the manufacturers of lithopone in the United States to ascertain the cost of production of lithopone during the first half of 1921 in order that costs, as reported by the commission [1] for the year 1919, might be brought to date and be available to committees of Congress in connection with the revision of the tariff act of 1913. A detailed schedule was submitted to various manufacturers, with the request that they submit their costs of production in accordance with the schedule. The reports, as received from the various manufacturers, were tabulated and were later verified by comparison with the books of the companies by members of the commission's staff.

Costs were reported on a more uniform basis by the manufacturers and in greater detail than in the previous investigation, which facilitated the comparison of costs between individual firms. There is still, however, a noticeable lack of uniformity among the various manufacturers in methods of treating certain cost items. These outstanding differences occur in the methods of handling raw material charges, determining sales expense, and in the treatment of administrative expenses.

The average cost of lithopone, shown in this report, is in all cases the weighted average; in no case has a simple average been used in presenting the various items of lithopone cost. It is believed that the costs as shown are representative of conditions existing in the lithopone industry during the first six months of 1921.

SUMMARY OF CONDITIONS IN THE INDUSTRY.

Only eight out of a total of 13 firms previously engaged in lithopone production were in operation during the first half of 1921. One of the five firms not operating reported that its plant was being dismantled.

In order to show what percentage of the productive capacity of the industry in the United States was in actual operation during the period for which costs were taken, manufacturers were requested to submit the productive capacity of their plants and the actual output of lithopone during the first half of 1921. An analysis of this information shows that only about one-third of the entire capacity of the domestic industry was in operation during that period; the eight firms which were in operation manufactured lithopone equal

[1] Barytes, Barium Chemical and Lithopone Industries, Including Costs of Production, 1919.—Tariff Information Series No. 18. The report gives a description of lithopone, its uses, statistics of production, imports, and prices, and a discussion of competitive conditions in the industry.

to about 40 per cent of capacity. The proportion of productive capacity of the various plants in operation ranged from a minimum of 14 per cent to a maximum of 65 per cent.

From the fact that such a small proportion of the domestic industry was in operation during this period the deduction should not be made that this inactivity was due to competition from imported lithopone. A study of production and import statistics shows that imports in 1920 were 3,427,321 pounds, or only 2.5 per cent of the domestic marketed production of 178,746,000 pounds. Imports for the firts six months of 1921 were slightly less than 2 per cent of the domestic output. Prewar imports were fairly constant at between 5,000,000 and 6,000,000 pounds per annum and supplied only a small proportion of domestic consumption. It is therefore evident that inactivity in the lithopone industry must be attributed to causes other than active competition from foreign sources.

In presenting these lithopone costs it should be pointed out that the costs as reported are undoubtedly higher than if all companies reporting had been operating at somewhere near capacity. Therefore, in considering the competitive strength of the domestic industry for tariff purposes allowance must be made for this fact. It is difficult to estimate to what extent costs would have been lowered if the industry had been operating at or near capacity. The effect of this suppressed production of lithopone is most accurately reflected in the increase in factory overhead cost, as compared with the year 1919, when the industry was operating—at least, during the last half of that year—at maximum capacity.

TOTAL COST OF LITHOPONE IN 1921, AS COMPARED WITH 1919.

Table 1 shows the weighted average cost of lithopone for all companies during the first six months of 1921 as compared with the same six months' periods in 1919. This table shows also the distribution of total cost to the items—material, direct labor, factory overhead, and selling expense. Column 9 shows the average profit for the industry by deducting the total cost from the average net sales price, as shown in column 8.

TABLE 1.—*Weighted average cost of lithopone for 1919 and first six months 1921.*

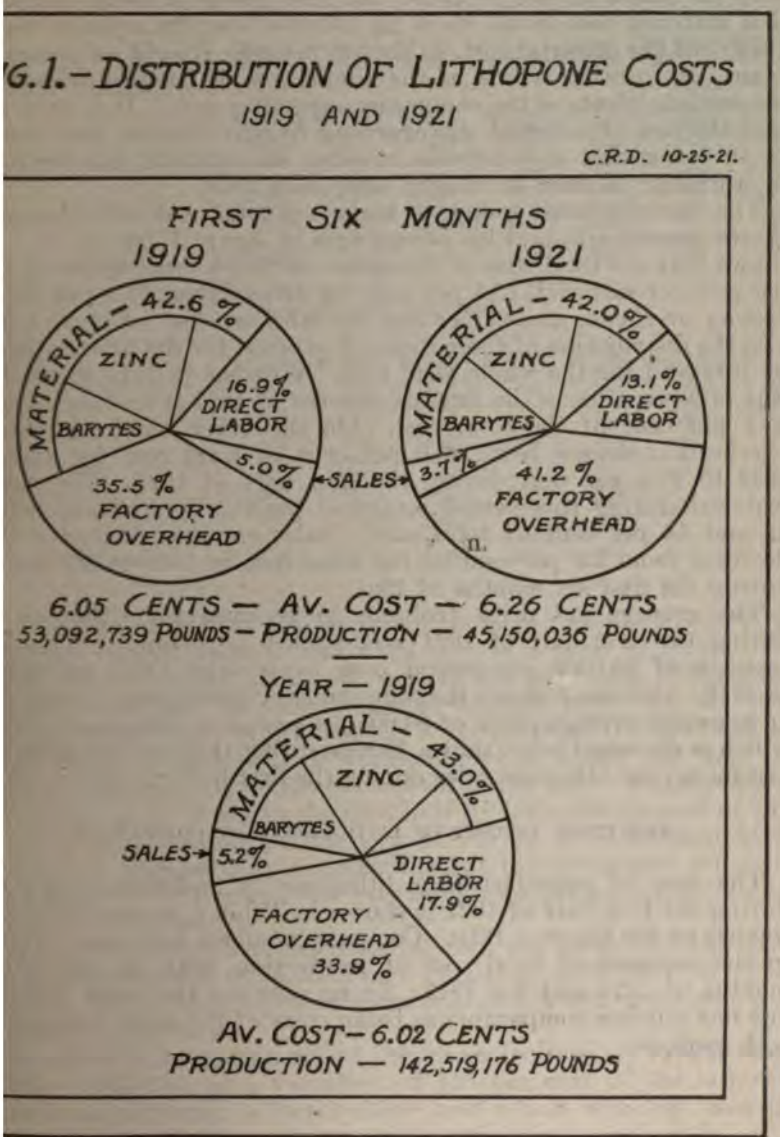
[Per pound.]

1 Period.	2 Production (pounds).	3 Total cost.	4 Material cost.	5 Direct labor cost.	6 Factory overhead.	7 Selling expense.	8 Average net sales price.	9 Apparent average profit.
1921 (first 6 months).....	45,150,036	$0.0626	$0.0263	$0.0082	$0.0258	$0.0023	$0.0676	$0.0050
1919 (first 6 months).....	53,092,739	.0605	.0258	.0102	.0215	.0030	a .0671	.0066
1919 (last 6 months).....	89,426,437	.0600	.0259	.0111	.0199	.0031	a .0653	.0053
1919 (12 months).....	142,519,176	.0602	.0259	.0108	.0204	.0031	a .0667	.0065

a Sales price for 1919 is gross price.

The total production of lithopone (column 2) for the first six months of 1921 amounted to slightly more than 45,000,000 pounds. As compared with the same period for 1919, this is a decrease of

ximately 8,000,000 pounds and is only about one-half the out-uring the last six months of 1919. This restricted production g the first half of 1921 is undoubtedly responsible for an in-in the total cost of manufacturing lithopone during 1921 as



pared with 1919. The total cost (column 3) for the first six ths of 1921 amounted to $0.0626 per pound, which is an increase .0024 per pound over the average cost for 1919. This increase tal cost is accounted for by the increase of factory overhead nse (column 6), which was greater by $0.0054 per pound than

for the year 1919. The increase in the factory overhead expense more than compensated for a decrease of $0.0026 per pound in direct labor cost (column 5) and a slight decrease in selling expenses. The material cost per pound of lithopone shows only a slight increase over the material cost in 1919. At first glance it seems surprising that material cost should show an increase over the average cost for 1919; but the material cost, as shown, includes frieght on material to plant, or, in other words, is the actual cost of barytes delivered at the various plants of the companies reporting costs. It is very likely that the cost of material, disregarding freight charges, was less than in 1919, but that any decrease in price of materials has been offset by a greater increase in freight rates since 1919.

The various items going to make up total cost of lithopone is shown graphically and by percentages in figure 1 (see p. 7). This shows that the total cost of lithopone—$0.0626—was made up of 42 per cent for material, 13.1 per cent for direct labor, 41.2 per cent for factory overhead, and 3.7 per cent for sales expense. Figure 1 shows also the distribution of these items of expense for the first six months of 1919 and for the whole year 1919. Whereas in 1919 direct labor was 17.9 per cent, in the first six months of 1921 it had decreased to 13.1 per cent of the total cost. On the other hand, the factory overhead increased from 33.9 per cent of total cost for the year 1919 to 41.2 per cent during the first half of 1921. The cost of material during this period remained practically constant between 42 and 43 per cent of total cost. Sales expense showed a slight decrease from 5.2 per cent of the total cost in 1919 to 3.7 per cent during the first six months of 1921.

The average *net* price (column 8) received for lithopone sold during the first half of 1921 was $0.0676 per pound. This is an increase of $0.0009 per pound over *gross* sales value as reported in 1919. Column 9 shows that the industry during this period made an apparent average profit of $0.005 per pound of lithopone. Table 2, which is discussed later, shows, however, that three of the eight firms lost money on lithopone sales during the first half of 1921.

VARIATION IN COST OF LITHOPHONE BY COMPANIES.

The cost of manufacturing lithopone by individual companies during the first half of 1921 is shown in Table 2, as well as costs by companies for the year 1919. Company numbers have been arranged in the sequence of total cost of production, both in the first six months of 1921 and for 1919. In no case are the costs shown for any one number comparable as being costs of the same company for both periods.

TABLE 2.—*Detailed average cost of lithopone by companies, 1919 and first six months of 1921.*

[Per pound.]

1921—FIRST SIX MONTHS.

1 Company No.	2 Total cost.	3 Material cost.	4 Direct labor.	5 Factory overhead.	6 Sales expense.	7 Net sales price	8 Profit or loss (−).
1	$0.0558	$0.0263	$0.0079	$0.0203	$0.0013	$0.0668	$0.0110
2	.0575	.0303	.0106	.0143	.0023	.0668	.0093
3	.0576	.0232	.0104	.0205	.0035	.0674	.0098
4	.0580	.0282	.0059	.0228	.0011	.0676	.0096
5	.0676	.0205	.0091	.0371	.0009	.0698	.0022
6	.0697	.0264	.0133	.0288	.0012	.0668	−.0029
7	.0728	.0232	.0066	.0370	.0060	.0666	−.0062
8	.0773	.0332	.0098	.0321	.0022	.0699	−.0074
Weighted average	.0626	.0263	.0082	.0258	.0023	.0676	.0050

1919—TWELVE MONTHS.

1	$0.0529	$0.0248	$0.0058	$0.0203	$0.0020	$0.0649	$0.0120
2	.0536	.0258	.0105	.0151	.0022	.0631	.0095
3	.0574	.0221	.0124	.0218	.0011	.0646	.0072
4	.0586	.0230	.0154	.0166	.0036	.0649	.0063
5	.0609	.0232	.0083	.0228	.0066	.0660	.0051
6	.0635	.0283	.0090	.0208	.0054	.0687	.0052
7	.0643	.0288	.0135	.0201	.0019	.0627	−.0016
8	.0653	.0307	.0211	.0121	.0014	.0696	.0043
9	.0697	.0251	.0111	.0324	.0011	.....	.....
10	.0744	.0303	.0095	.0276	.0070	.0714	−.0030
11	.0751	.0329	.0085	.0274	.0063	.....	.....
Weighted average	.0602	.0259	.0108	.0204	.0031	.....	.....

Column 2 shows that the variation in total cost of lithopone by companies ranged from a low of $0.0558 to a high of $0.0773 per pound, or a variation of 38 per cent of the low cost. Four firms reported a cost less than the weighted average cost. On the basis of actual production, approximately two-thirds of the total output during the first half of 1921 was produced at a cost less than the weighted average. Although not shown in the table, it is significant that neither in 1919 nor in the first half of 1921 did the cost of production vary according to the size of output of individual firms. However, it may be said, in general, that the companies reporting lowest costs in 1921 were those operating at a maximum percentage of productive capacity.

Column 3 shows that the material cost per pound of lithopone ranged from $0.0205 to $0.0332, or a variation of 62 per cent of the low cost. Three firms reported a material cost which was lower than the average of all firms.

The direct labor per pound of lithopone (column 4) ranged from $0.0059 to $0.0133, or a variation of 125 per cent of the low cost. Three firms reported a direct labor cost which was less than the average.

Factory overhead expense, shown in column 5, ranged from $0.0143 per pound of lithopone to $0.0371, or a variation of 160 per cent of the low cost. Factory overhead shows a greater variation than any other item of factory cost. This may be readily accounted for by the wide discrepancy in the percentages of the productive capacity of the firms which were in operation.

Sales expense reported for 1921 ranged from $0.0009 per pound of lithopone to $0.006, or a variation of 600 per cent of the low cost. This wide variation in sales expense is due to the fact that some of the companies consumed practically all of their own production, and therefore they had little sales expense, while some of the other firms had to market practically all of their output.

Column 7 shows that the net sales price received for lithopone during the first six months of 1921 was fairly uniform, and varied only 5 per cent from the low, $0.0666 per pound, to the highest net price received, $0.0699. Six firms reported a net sales price equal to or below the weighted average of $0.0676 per pound.

Column 8 shows the actual profit or loss during the first half of 1921. Three firms had a loss on their lithopone sales ranging from $0.0029 per pound to $0.0074, whereas the remaining five firms reported a profit which ranged from $0.0022 to $0.011 per pound. As there was very little difference in the net price received for lithopone during 1921, profits were in inverse ratio to the total cost of production. Interest on capital investment and Federal taxes were not included as items of expense in arriving at total cost, and therefore these factors have had no influence on the average profit or loss shown in column 8.

DETAILS OF MATERIAL COST.

Table 3 shows details of material cost by companies compared with the total factory cost of lithopone. The determination of material costs was somewhat complicated by the fact that the method of treating materials varied between the various companies. Some kept separate accounts for barium sulphide—made from barytes—and for zinc sulphate liquor, and these intermediate materials were charged to the lithopone account at cost of manufacture. In such cases the charges for barium sulphide and zinc sulphate, which were reported in detail, were segregated into details of material, direct labor, and factory overhead, so as to make the details of the total cost of lithopone comparable by companies. This distribution in no case has changed the total cost of lithopone as reported by these companies.

TABLE 3.—*Details of material cost compared with total factory cost of lithopone, by companies, for first six months 1921, and weighted averages compared with 1919.*

[Costs are per pound. Percentages are of total factory costs.]

1921—FIRST SIX MONTHS.

Company No.	Total factory cost.	Total material.		Barytes.		Zinc.		All other materials.	
		Cost.	Per cent.	Cost.	Per cent.	Cost.	Per cent.	Cost.	Per cent.
1	2	3	4	5	6	7	8	9	10
1	$0.0545	$0.0263	48.26	$0.0103	18.90	$0.0101	18.53	$0.0059	10.83
2	.0552	.0303	54.90	.0095	17.21	.0105	19.02	.0103	18.67
3	.0541	.0232	42.90	.0083	15.34	.0089	16.45	.0060	11.11
4	.0569	.0282	49.56	.0099	17.40	.0117	20.56	.0066	11.60
5	.0667	.0205	30.74	.0072	10.80	.0084	12.60	.0049	7.34
6	.0683	.0264	38.54	.0093	13.58	.0104	15.18	.0067	9.78
7	.0668	.0232	34.73	.0077	11.52	.0108	16.17	.0047	7.04
8	.0751	.0332	44.21	.0093	12.38	.0129	17.18	.0110	14.65

ABLE 3.—*Details of material cost compared with total factory cost, etc.*—Contd.

WEIGHTED AVERAGES FOR ALL COMPANIES.

Period.	Total factory cost.	Total material.		Barytes.		Zinc.		All other materials.	
		Cost.	Per cent.	Cost.	Per cent.	Cost.	Per cent.	Cost.	Per cent.
1	2	3	4	5	6	7	8	9	10
1921 (first 6 months)	$0.0603	$0.0263	43.61	$0.0091	15.09	$0.0107	17.74	$0.0065	10.78
1919 (first 6 months)	.0575	.0258	44.87	.0079	13.74	.0123	21.39	.0056	9.74
1919 (last 6 months)	.0569	.0259	45.52	.0078	13.71	.0126	22.14	.0055	9.67
1919 (12 months)	.0571	.0259	45.37	.0079	13.84	.0124	21.72	.0056	9.81

The total factory cost (column 2) does not include sales expense, but is the sum of material, direct labor, and factory overhead charges. This column shows a range in cost per pound of lithopone from $0.0541 to $0.0751. It is interesting to note that the company which had the third lowest total cost of lithopone had the lowest factory cost. The weighted average factory cost for the first six months of 1921 amounted to $0.0603 per pound of lithopone as compared with $0.0571, the average for the year 1919.

It is seen from table 3 (column 4) that the total material cost during the first half of 1921 was about 44 per cent of the total factory cost. Of the two primary materials—zinc and barytes—entering into the manufacture of lithopone, zinc was slightly more expensive, and amounted to $0.0107 per pound, or nearly 18 per cent of the total factory cost, whereas the barytes amounted to $0.0091 per pound, or 15 per cent of total factory cost.

The average purchase cost of crude barytes as reported by all firms was $14.93 per short ton, as compared with an average of $13.60 in 1919, or an increase of about 10 per cent. This may be largely, if not wholly, attributed to the increase in freight rates from barytes mines to the lithopone plants, as by far the larger part of the barytes consumed during the first half of 1921 was of domestic origin.

An analysis of the reports submitted by the manufacturers shows that on an average 1.22 pounds of barytes ore and 0.207 pounds of zinc (Zn) were consumed for every pound of lithopone produced.

The cost of all other materials, which include coal used for reduction of barytes, ranged from $0.0047 to $0.0110 per pound of lithopone. The weighted average of all firms was $0.0065, or about 11 per cent of the total factory cost. This was a slight increase over the cost of all other materials in 1919, when the average for the year was $0.0056.

DETAILS OF FACTORY OVERHEAD.

Table 4 shows in detail the factory overhead expense compared in percentages with total factory cost.

Column 4 shows that the total factory overhead amounted to 42.8 per cent of the total factory cost. The actual cost per pound of lithopone is shown in column 3, and amounted to $0.0258 for factory

overhead expenses. As previously pointed out, factory overhead chiefly accounts for the increase in the total cost of lithopone during the first half of 1921 over 1919. Column 3 shows that the increase was $0.054 per pound of lithopone, or approximately 25 per cent, over the average factory expense for 1919.

The average total factory overhead expense (column 3) was $0.0258 per pound of lithopone; this item was made up of $0.0144 per pound for works expense, $0.0020 for bags and barrels, $0.0039 for fixed charges, $0.0007 for laboratory, and $0.0048 for administration expenses.

TABLE 4.—*Details of factory overhead compared with total factory cost of lithopone, by companies, for first six months of 1921 and weighted average compared with 1919.*

[Costs are per pound. Percentages are of total factory cost.]

1921—FIRST SIX MONTHS.

Company No.	Total factory cost.	Total factory overhead.		Details of factory overhead.				
		Cost.	Per cent.	Works expense.	Bags and barrels.	Fixed charges.	Laboratory.	Administration.
1	2	3	4	5	6	7	8	9
1	$0.0545	$0.0203	37.25	$0.0136	$0.0012	$0.0023	$0.0002	$0.0030
2	.0552	.0143	25.91	.0038	.0019	.0061	.0008	.0017
3	.0541	.0205	37.90	.0097	.0016	.0053	.0012	.0027
4	.0569	.0228	40.07	.0102	.0026	.0014	.0011	.0075
5	.0667	.0371	55.62	.0226	.0017	.0117	.0003	.0008
6	.0685	.0288	42.05	.0160	.0018	.0087	.0002	.0021
7	.0668	.0370	55.40	.0289	.0017	.0019	(1)	.0045
8	.0751	.0321	42.75	.0175	.0026	.0058	.0007	.0053

WEIGHTED AVERAGES FOR ALL COMPANIES.

Period.	Total factory cost.	Total factory overhead.		Details of factory overhead.				
		Cost.	Per cent.	Works expense.	Bags and barrels.	Fixed charges.	Laboratory.	Administration.
1	2	3	4	5	6	7	8	9
1921 (first 6 months)	$0.0603	$0.0258	42.79	$0.0144	$0.0020	$0.0039	$0.0007	$0.0048
1919 (first 6 months)	.0575	.0215	37.39	.0147	.0014	.0025	.0002	.0027
1919 (last 6 months)	.0569	.0199	34.98	.0140	.0018	.0018	.0003	.0020
1919 (12 months)	.0571	.0204	35.73	.0142	.0016	.0021	.0002	.0023

[1] Included in works expense.

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UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 25

Preliminary Summary of

Census of Dyes and Coal-Tar Chemicals, 1921

WASHINGTON
GOVERNMENT PRINTING OFFICE
1922

UNITED STATES TARIFF COMMISSION,

Office: Eighth and E Streets NW., Washington, D. C.

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LETTER OF TRANSMITTAL.

UNITED STATES TARIFF COMMISSION,
Washington, May 11, 1922.

HE CHAIRMAN:

e Tariff Commission is in receipt of your letter of May 4, 1922, llows:

MAY 4, 1922.

THOMAS O. MARVIN,
hairman United States Tariff Commission, Washington, D. C.

R MR. MARVIN: Please furnish for the use of the Committee on Finance any ation you may have available relative to the 1921 production, imports, exports, ices of coal-tar products and other chemicals.

Yours sincerely,

P. J. MCCUMBER, *Chairman.*

compliance with your request the Tariff Commission submits llowing report, Preliminary Summary of Census of Dyes and Tar Chemicals, 1921, containing data on the production, im- exports, and prices of coal-tar dyes and other coal-tar chemicals r 1921.

Very respectfully,

THOMAS O. MARVIN, *Chairman.*
WILLIAM S. CULBERTSON, *Vice Chairman.*
DAVID J. LEWIS.
EDWARD P. COSTIGAN.
THOMAS WALKER PAGE.
WILLIAM BURGESS.

n. P. J. MCCUMBER,
Chairman Committee on Finance,
United States Senate, Washington, D. C.

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INTRODUCTION.

The United States Tariff Commission has reported annually, beginning with 1917, the progress of the American dye industry. These reports in each instance have been based upon reports submitted by each manufacturer as to his production of dyes and other coal-tar chemicals.

Since 1919, and in this preliminary report, the production figures on dyes have been supplemented by a complete census of dyes imported for consumption in the United States. Other reports prepared by the Tariff Commission relating to conditions in the dye industry include (1) "Cost of Production in the Dye Industry, 1918 and 1919," and (2) "Dyes and Other Coal-Tar Chemicals, December 12, 1918."

This preliminary summary is published in compliance with a request of the chairman of the Senate Finance Committee. It represents a special investigation made by the Tariff Commission as to the production and sales of dyes and other coal-tar chemicals in the United States. The final report, which will give a more complete discussion of the industry in 1921, will appear later under the title "Census of Dyes and Organic Chemicals, 1921." There will be included in the subsequent report, for the first time, a census of synthetic organic chemicals other than those derived from coal tar. This preliminary summary is based upon the production of 200 firms engaged in the manufacture of products derived from coal tar which, it is believed, represents a complete record of all these products manufactured in the United States.

It contains a brief summary of important developments in the output of dyes and coal-tar chemicals during 1921. Detailed tables are given showing the production of crudes, dyes, and intermediates, and other coal-tar chemicals in 1921. In addition these tables contain, for the first time, the quantity and value of the sales of each product. Figures for each product are given in all cases where publication does not reveal the operations of individual manufacturers. Prices of a selected list of dyes from 1917 to 1921 are tabulated with the invoice values of the same dyes imported in 1914. Comparison tables showing the quantity of production in 1920 and 1921 are given; also a comparison of the production of dyes classified according to method of application.

A detailed census of dyes imported for consumption in the United States during the calendar year 1921 is contained in the report. This tabulation shows the quantity and value of imports of individual dyes and the percentage of the quantity of each dye by countries of origin. A list of manufacturers whose production during 1921 was reported to the Tariff Commission is also included.

In the preparation of this report the Tariff Commission had the services of Warren N. Watson and C. R. DeLong, of the chemical division, and of others of the commission's staff.

PRELIMINARY SUMMARY OF CENSUS OF DYES AND COAL-TAR CHEMICALS, 1921.

Summary of Domestic Production, 1921.

CRUDES.

The Tariff Commission pointed out in its Census of Coal-Tar Dyes and Chemicals, 1920, that the output of coal-tar by the American coke ovens was sufficient to meet demands in the coal-tar chemical industry for crude materials. A significant feature of the 1921 coke output was that an increased percentage of the total was by-product coke, with a corresponding decreased percentage from the beehive type of ovens, although the total production of coke in 1921 was less than in 1920. This increase in the proportion of by-product coke insures an adequate supply of coal tar for the distillation of coal-tar crudes which furnish the basis of all chemical products manufactured from coal tar.

INTERMEDIATES.

The total production of intermediates in 1921 by 107 different manufacturers was 70,899,912 pounds, a decrease of 73 per cent in quantity from the 1920 output. The total sales during 1921 were 53,637,326 pounds valued at $8,483,463. The average price per pound of all intermediates sold in 1921 was 25 cents per pound compared with a price of 37 cents per pound for the total production of intermediates in the previous year.

The number of intermediates reported in 1921 was 232 compared with 236 in 1920. Of the total number reported in 1921, 49 were reported for the first time. Many of these new products were of special importance in considering the progress of the industry, as they are required in the production of the more complex and faster types of dyes and represent a significant development in the industry. Several of these new intermediates are used directly in the production of dyes upon the fiber and have heretofore been imported. The large decrease in the 1921 production of intermediates may be attributed to several causes: (1) The loss of most of our export trade in dyes, (2) the large stocks carried over from the previous year, and (3) a general business depression. There has been a general decline in output of intermediates since 1918, due to the fact that at that time a large part of the intermediates were consumed for munitions, poison gases, and for special dyes required in large quantities for dyeing military cloths.

In general, the intermediates used in producing those dyes consumed in the largest quantity show large reductions. There were, however, notable increases in certain intermediates of the more specialized types and the tendency during 1921 has been toward

the production of intermediates which more nearly represent norm domestic requirements.

During 1921 the export trade in dyes was greatly reduced as co pared with 1920; hence, the intermediates produced in that ye were used in the manufacture of dyes which more nearly represe the needs for consumption of the domestic textile industry. I addition to the requirements of the domestic dye manufacture these intermediates are also used in the production of photographi chemicals, medicinals, flavors, perfume materials, synthetic phenoli resins, and synthetic tanning materials. There are still a few inter mediates for which production is not yet reported, or reported onl in small amounts, which should be added to the domestic manufac turing program in order to give a complete line of dyes of domesti manufacture.

The production of coal-tar chemicals used for research and experi mental purposes totaled 2,012 pounds in 1921, compared with 1,83 pounds for the previous year. Total sales of these products amounte to 901 pounds, valued at $18,334. These products are essential fo both technical and scientific research and are a necessary adjunct t the development of the domestic coal-tar chemical industry.

DYES AND OTHER FINISHED PRODUCTS.

Dyes.—The domestic production of dyes in 1921 by 74 manufac turers totaled 39,008,690 pounds, a decrease of 56 per cent from tha of 1920. The sales during 1921 totaled 47,513,762 pounds, with value of $39,283,956. The sales exceeded the production by 22 pe cent, indicating that a part of the domestic consumption for th year was supplied from stocks carried over from the previous year abnormal production. The average sales price of dyes for 1921 wa 83 cents per pound compared with $1.08 for 1920 and $1.07 for 191 The greatly reduced output of 1921, as was stated under "Interm diates," may be accounted for by (1) loss of the most of our expo trade, (2) the large stocks carried over from the previous year, ar (3) the business depression.

The progress of the year includes the manufacture for the fir time in this country of a large number of dyes of greater complexit and more specialized application. The development of these pro ucts is a highly technical achievement and creditable to the industry Dyes of each class (according to application) are among the ne products manufactured in 1921, and a considerable number of thes new colors were among the most important colors not heretofore mad in the United States. This progress has continued during the spring of 1922, as production of many new dyes has been reported during the first five months of the latter year.

The production of dyes in 1921, grouped by classes according t method of application, is as follows: Acid dyes, 7,751,698 pounds, o 19.87 per cent of the total production; basic dyes, 1,852,243 pounds or 4.75 per cent; direct cotton dyes, 6,787,634 pounds, or 17.4 pe cent; sulphur dyes, 10,239,255 pounds, or 26.25 per cent; vat dyes including indigo, 7,019,120 pounds, or 17.99 per cent, the vat color being divided as follows: Indigo, 6,673,968 pounds and other vat 345,152 pounds; mordant and chrome colors, 3,773,438 pounds, or 9.6

per cent; lake and spirit soluble dyes, 697,444 pounds, or 1.79 per cent; unclassified dyes, 887,858 pounds, or 2.28 per cent.

Color lakes.—The total output by 43 firms of this class of pigments was 6,152,187 pounds compared with 10,983,538 pounds, valued at $5,871,820 in 1920. Total sales of color lakes for 1921 amounted to 6,424,612 pounds, valued at $2,863,189.

Photographic chemicals.—The production by five firms of these coal-tar chemicals used as photographic developers, totaled in 1921, 183,798 pounds compared with 440,759 pounds in 1920. Sales during 1921 amounted to 170,221 pounds, valued at $248,041.

Medicinals.—This class of coal-tar products made by 34 firms, may be considered one of the most important, as they are essential to the Nation's welfare. The highest technical and research skill is required in the development and commercial production of these chemicals. During 1921 conspicuous progress was made in the development of synthetic medicinals of coal-tar origin. The total production for 1921 was 1,545,917 pounds, including a small quantity of disinfectants, the sales amounting to 1,876,246 pounds, valued at $2,930,324. The 1920 production, including a considerable quantity of disinfectants, was 5,184,989 pounds, valued at $5,726,776. Total production figures for 1920 and 1921 are, however, not strictly comparable, due to the large quantity of disinfectants of a relatively low value reported in 1920 and the small quantity of this group reported in 1921.

Perfumes and flavors.—These coal-tar products are closely related and certain members of this class are used both as flavors and perfumes. The total output of flavors by 17 firms in 1921 was 901,245 pounds, compared with 166,884 pounds in 1920. Sales for 1921 amounted to 933,662 pounds, valued at $1,002,018. The production of perfumes by 15 firms in 1921 was 119,335 pounds, compared with 90,740 pounds for the previous year. Sales in 1921 amounted to 119,691 pounds, valued at $175,815.

Synthetic phenolic resins.—These products are used as substitutes for rubber in making pipestems and similar articles, electrical insulators, varnishes, and lacquers. The 1921 production by three firms was 1,643,796 pounds, compared with a production of 4,659,680 pounds during the previous year. Sales in 1921 amounted to 1,674,456 pounds, valued at $1,352,166.

Synthetic tanning materials.—The output of these products by four firms amounted to 1,902,597 pounds in 1921, compared with 3,142,861 pounds in 1920. The sales were 1,721,359 pounds, valued at $141,005 during 1921.

TABLE 1.—*Summary of the production of coal-tar chemicals, 1918 to 1921, inclusi*

	1918			1919		
	Number of manufacturers.	Production.		Number of manufacturers.	Production.	
		Quantity.	Value.		Quantity.	Value.
		Pounds.			*Pounds.*	
Group II—Intermediates	128	357,662,251	$124,382,892	116	177,362,426	$63,210,0
Group III:						
Finished products		76,802,959	83,815,746	155	82,532,390	84,585,3
Dyes	78	58,464,446	62,026,390	90	63,402,194	67,598,8
Color lakes	29	9,590,537	5,020,023	34	7,569,921	4,179,9
Photographic chemicals	6	316,749	823,915	10	335,509	1,059,3
Medicinals	31	3,623,352	7,792,984	31	6,777,988	7,883,0
Flavors	7	458,256	4,925,627	9	610,825	1,318,4
Perfumes	6	116,263	584,695	6	41,419	164,3
Tanning materials	1	4,233,356	2,642,120	1	3,794,534	2,381,3
Synthetic phenolic resins	5			5		

	1920			1921			
	Number of manufacturers.	Production.		Number of manufacturers.	Production.	Sales.	
		Quantity.	Value.		Quantity.	Quantity.	Valu
		Pounds.			*Pounds.*	*Pounds.*	
Group II—Intermediates	119	257,726,911	$95,291,686	107	70,899,912	$33,637,326	$8,483,
Group III:							
Finished products	161	112,942,227	112,731,547	147	51,457,365	60,434,909	47,998,
Dyes	82	88,263,776	95,613,749	74	39,008,690	47,513,762	39,283,
Color lakes	43	10,983,538	5,871,820	43	6,152,187	6,424,612	2,863,
Photographic chemicals	8	440,759	1,015,848	5	183,798	170,221	248,
Medicinals	35	5,184,989	5,726,776	34	1,545,917	1,876,246	2,939,
Flavors	15	106,884	527,493	17	901,245	933,662	1,002,
Perfumes	12	99,740	332,008	15	119,335	119,991	175,
Tanning materials	4	3,142,861	233,674	4	1,902,597	1,721,359	141,
Synthetic phenolic resins	4	4,659,680	3,410,179	3	1,643,796	1,674,456	1,432,

TABLE 2.—*By-products obtained from coke-oven operations in 1919, 1920, and 192*

[Mineral Resources—United States Geological Survey.]

Product.	Unit.	1919			Ave age u valu
		Production.	Sales.		
		Quantity.	Quantity	Value.	
Tar	Gallons	288,898,764	217,980,143	$6,919,365	$0.
Ammonia:					
Sulphate	Pounds	544,231,985	557,619,631	21,075,718	
Anhydrous, or free ammonia	Pounds, NH_3	50,535,639	51,636,744	[2] 5,692,950	
Sulphate equivalent	Pounds				
Gas:					
Distributed through city mains	1,000 cubic feet		5,238,486	2,106,806	
Used in steel or affiliated plant	do				
Used under boilers	do				
Industrial purposes	do		138,179,761	8,015,877	
Public service corporation	do		49,655,732	6,562,324	
Light oil and derivatives:					
Crude light oil	Gallons	92,356,750			
Benzol—					
Crude	do	44,060,970	44,697,615	7,776,669	
Refined	do	17,006,532	18,403,909	3,783,552	

[1] Press notice, United States Geological Survey.
[2] *Includes anhydrous* ammonia reported as such—and ammonia liquor converted to equivalent.

ABLE 2.—*By-products obtained from coke-oven operations in 1919, 1920, and 1921*—Continued.

Product.	Unit.	1919			
		Production.	Sales.		Average unit value.
		Quantity.	Quantity.	Value.	
ght oil and derivatives—Continued.					
Motor fuel	do	(3)			
Toluol—					
Crude	do				
Refined	do	1,160,136	1,353,827	355,990	.263
Solvent naphtha	do	3,915,489	3,625,978	552,853	.152
Other refined oils	do	575,885	127,483	18,358	.144
Naphthalene—					
Crude	Pounds	3,549,998	4,038,456	82,244	.020
Refined	do	2,763,271	2,663,585	109,120	.041
her products sold				645,142	
Total value of sales				63,696,868	

Product.	Unit.	1920				1921
		Production.	Sales.			Estimated production.[4]
			Quantity.	Value.	Average unit value.	
	Gallons	360,664,124	174,363,696	$6,378,040	$0.037	233,000,000
mmonia:						
Sulphate	Pounds	675,816,486	626,013,975	27,110,260	.043	
Anhydrous, or free ammonia	Pounds, NH_3	65,777,259	62,076,772	[5] 8,585,173	.138	
Sulphate equivalent	Pounds	938,925,522	874,321,063	35,695,433	.041	607,000,000
Distributed through city mains	1,000 cubic feet	476,485,744	53,220,824	15,716,888	.295	308,000,000
Used in steel or affiliated plant	do		151,764,807	14,301,095	.094	
Used under boilers, etc.	do		25,430,288	2,216,335	.087	
				32,234,318	.140	
Industrial purposes	do					
Public service corporation	do					
ght oil and derivatives:						
Crude light oil	Gallons	109,709,915	1,067,045	[6] 126,158	.118	71,000,000
Benzol—						
Crude	do	8,747,572	1,510,420	401,296	.266	
Refined	do	16,977,556	15,720,356	4,096,527	.260	
Motor fuel	do	57,645,462	55,764,265	[7] 12,644,931	.227	
Toluol—						
Crude	do	287,142				
Refined	do	2,710,649	2,470,364	740,722	.300	
Solvent naphtha	do	5,678,525	4,695,464	851,048	.181	
Other refined oils	do					
Naphthalene—						
Crude	Pounds	11,246,807	11,507,703	307,999	.027	
Refined	do	2,921,282	2,941,059	179,975	.061	
				19,348,656		
her products sold				[8] 36,317		
Total value of sales				[9] 93,692,764		

[3] Included in crude benzol.
[4] Estimated by assuming that the quantity of the several by-products obtained bore the same relation to the known production of coke in 1921 as in 1920. The recoveries per ton of coal charged in 1920 were as follows: Ammonia (sulphate or equivalent), 21.4 pounds; tar, 8.2 gallons; crude light oil, 2.7 gallons; gas [illegible] M cubic feet.
[5] Mostly ammoniacal liquor, reported in content of NH_3.
[6] The quantity of crude light oil refined by the producer amounted to 105,564,417 gallons.
[7] The benzol content of motor fuel ranged from 50 to 100 per cent.
[8] Includes coal-tar oil, crude heavy solvent, carbon, and pyridin oil.
[9] Exclusive of coke breeze, of which 2,460,835 tons was produced and 533,019 tons was sold at a value of [illegible].

DETAILED PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1

TABLE 3.—*Production of coal-tar crudes during 1921, by firms not primarily engag the operation of coke-oven plants and gas houses.*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers giv page 70. An X indicates that the corresponding product was made by a manufacturer who di consent to the publication of his name in connection therewith. Blanks in the third and fourth col indicate that there was actual production of the corresponding article, but that the figures can n published without revealing the output of individual firms.]

Name.	Manufacturers' identification number (according to list on page 70.	1921		
		Quantity.	Value.	Val u
Total crudes [1]			$17,936,160	
Benzene.....gallons..	17, 23, 35, 42, 118, 128, X.....	2,171,631	463,205	
Toluene.....do....	17, 35, 128			
Xylene.....do....	17			
Naphthalene, crude.....pounds..	13, 17, 29, 35, 42, 46, 87, 99, 118, 138, 145, 153, X, X, X.	16,949,464	380,167	
Anthracene, 25 per cent pure.....do....	17, 138, 145, X, X	1,604,717	83,707	
Carbazol, crude, 60 per cent.....do....	138			
Cresol.....gallons..	17, 138, X			
Pyridine.....do....	17, 113			
Solvent naphtha.....do....	13, 17, 35, 42, 87, 128, 145, X...	649,694	111,286	
Dead or creosote oil.....do....	13, 17, 23, 28, 29, 42, 46, 71, 85, 99, 118, 138, 145, 153, 166, X, X, X, X, X.	28,864,156	3,188,867	
Anthracene oil.....do....	138, 145, X, X	2,857,391	519,347	
Pitch of tar.....tons..	13, 17, 23, 28, 29, 42, 46, 71, 85, 99, 118, 138, 145, 153, 160, 174, X.	347,011	6,514,200	
Other distillates.....gallons..	13, 17, 23, 28, 42, 46, 85, 87, 99, 138, 153, X.	6,562,332	1,209,291	
Refined tars.....barrels..	13, 17, 23, 46, 71, 85, 99, 118, 138, 145, 153, X, X, X.	1,029,282	5,196,427	

[1] The instructions sent to manufacturers were as follows:

Include under "dead or creosote oil" only products which may be used for creosoting.

Include under "other distillates" shingle-stain oils, disinfectant oils, and flotation oils which d contain over 5 per cent phenol. Include under "refined tars" those tars which are used for road ment, saturating felt, and for protective coatings. Phenol and all distillates which on being subj to distillation yield in the portion distilling below 200° C. a quantity of tar acids equal to or more t per cent of the original distillate are not to be included here, but are to be placed in Group II.

Cresol, for the purpose of this report, is defined as a distillate containing more than 5 per cent of p and at least 50 per cent of the isomeric cresols.

TABLE 4.—*Comparison of production of coal-tar crudes, 1920 and 1921, by firms primarily engaged in the operation of coke-oven plants and gas houses.*

Name.	1921			1920		
	Quantity.	Value.	Value per unit.	Quantity.	Value.	Va per u
Total crudes.....	.....	$17,936,160	.....	.....	$21,163,937	.....
Benzene.....gallons..	2,171,631	463,205	$0.21	875,561	287,586	
Naphthalene, crude.....pounds..	16,949,464	380,167	.02	26,393,411	791,403	
Anthracene, 25 per cent pure.do....	1,604,717	83,707	.21	2,829,500	114,661	
Solvent naphtha.....gallons..	649,694	111,286	.17	472,000	74,669	
Dead or creosote oil .....do....	28,864,156	3,188,867	.11	37,557,245	4,395,290	
Anthracene oil.....do....	2,857,391	519,347	.18	3,284,102	593,839	
Pitch of tar.....tons..	347,011	6,514,200	18.77	342,401	5,245,554	
Other distillates.....gallons..	6,562,332	1,209,291	.18	8,052,242	1,577,727	
Refined tar.....barrels..	1,029,282	5,196,427	5.05	1,386,056	7,582,553	

TABLE 5.—*Production and sales of coal-tar intermediates during 1921.*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 70. An X signifies that the corresponding intermediates were made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there were sales of the corresponding intermediates in the United States during 1921, but that the figures can not be published without revealing information in regard to the sales of individual firms. The blank space in the sixth column indicates that there was actual production of the corresponding intermediates in the United States during 1921, but that the figures can not be published without revealing information in regard to the output of individual firms. The details thus concealed are, however, included in the totals. Reports have been received from all firms known to be manufacturers.]

Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Total intermediates		33,637,326	8,483,463	$0.25	70,899,912
Acetanilide, tech	3, 22, 34, 112, 124, 145	12,865	2,957	.23	1,152,713
Acetyl-p-phenylenediamine (p-amino acetanilide)	53, 64, 69, 114, 116, 145			1.63	84,742
Acetyl-p-toluidine	34, 53, 145				
Alpha-amino anthraquinone	10				
Beta-amino anthraquinone	53, 114, 116				
Amino-azo-benzene	27, 34, 53, 55, 69, 70, 72, 93, 114, 145			.97	49,763
Amino-azo-toluene	27, 34, 53, 69, 72, 114, 117			.63	35,867
Aminobenzoic acid	76, 110, 144				
Amino dimethylaniline	X				
Amino diphenylamine-o-sulfonic acid	5				
Amino-2-naphthol-4-sulfonic acid	22, 34, 53, 93, 117, 145, X			.82	449,996
Amino-8-naphthol-4-sulfonic acid	34, 114, 116				
Amino-8-naphthol-2:4-disulfonic acid (Chicago acid)	53, 114				
Amino-8-naphthol-3:6-disulfonic acid (H acid)	22, 53, 69, 109, 111, 114, 116, 117, 122	988,277	945,945	.95	1,639,323
Amino-5-naphthol-7-sulfonic acid (J acid)	53, 114, 116				
Amino-8-naphthol-6-sulfonic acid (Gamma acid)	22, 24, 27, 93, 114, 116	32,528	68,373	2.10	218,717
Amino-phenol-4-sulfonic acid	117				
Aminophenol	8, 144, 163, 167	9,366	21,581	2.30	12,775
Aminophenol-p-sulfonic acid	22, 69, 114, 117, 167			.95	54,355
p-Aminophenol and hydrochloride	8, 31, 53, 93, 116, 144, 163, 167	40,587	56,275	1.39	72,572
Aminophenyltolylamine sulfonic acid	116				
Aminosalicylic acid	24, 45, 53, 114				
Anhydro benzene thiazol and derivatives	X				
Aniline oil	24, 27, 53, 108, 112, 114, 134, X, X	5,259,598	1,161,381	.22	5,639,234
Aniline salt (and sulphate)	24, 72, 114, X	366,533	97,225	.27	
Aniline for red	114				
Anisidine	114, 116				
Anthracene blue, base	114				
Anthracene, refined	138				
Anthranilic acid (o-aminobenzoic)	53, 61, 112, 160			.34	35,616
Anthraquinone	19, 53, 88, 114, 141, 156	29,422	46,700	1.59	125,358
Anthraquinone-1:5-disulfonic acid	10, 69, 114				
Anthraquinone-1:5-and-1:8-disulfonic acid	116				
Anthraquinone-2-sodium sulfonate (silver salt)	10, 19, 53, 116				
Anthraquinone-1:8-dinitro-1:5-disulfonic acid	116				
Arsanilic acid	47				
Benzalchloride and benzotrichloride	61, X				
Benzaldehyde	61, 89, 124, 143, 162, X	82,234	59,217	.72	66,365
Benzanthrone	10, 53, 116				
Benzidine base and sulfate	2, 6, 22, 53, 70, 111, 114, 116, 161, X	277,388	235,076	.85	328,577
Benzoate of soda	79, 124, 144, X, X	413,595	236,784	.57	381,154
Benzoic acid, U. S. P	79, 124, 143, 144, X	29,734	18,432	.62	190,483

TABLE 5.—*Production and sales of coal-tar intermediates during 1921—Continued*

Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Product 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pound*
Benzoic acid, tech	79, 144				
Benzoyl benzoic acid	116				
Benzoyl chloride	79				
Benzyl acetate	X				
Benzyl alcohol	89, 144, 150, 162, X, X, X.	9,959	10,142	1.02	17
Benzylamine	X				
Benzyl chloride	61, 79, 124, 143, 162			.22	473
Broenner's acid, see 2-naphthylamine-6-sulfonic acid.					
Bromobenzene	61				
Carbazol, refined	61				
o-Chlorobenzaldehyde	114				
Chlorobenzanthrone	53				
Chlorobenzene (mono)	79, 93, 143			.10	1,692
Chlorometanilic acid	64				
Chloronaphthalene	X				
1-Chloro-8-naphthol-3:6-disulfonic acid.	114				
2-Chloro-5-nitrotoluene-4-sulfonic acid.	145				
Chlorotoluene	114				
2-Chloro-5-toluidine-4-sulfonic acid	97, 106, 145				
Chromotropic acid, see 1:8-Dihydroxy naphthalene-3:6-disulfonic acid.					
Cinnamic acid	89, 150, X, X	807	2,538	3.14	
Creosote oil, containing more than 5 per cent tar acids.	13, 46, 174				
Cresol-ortho, meta and para	17, 102				
o-Cresol, purity of 90 per cent or more.	17, 151				
o-Cresotinic acid	X				
Dehydrothio-p-toluidine sulfonic acid.	59, 64, 114, X			1.62	18
1:5-Diamino anthraquinone	10				
2:6-Diaminophenol-4-sulfonic acid.	117				
Diaminostilbene disulfonic acid	59, 114, 116			2.08	66
Dianisidine	53, 114, 116				
1-Diazo-2-napthol-4-sulfonic acid.	22, 93, 117				
Dibenzanthrone	116				
Dichloroaniline	5, 116				
o-Dichlorobenzene	93				
p-Dichlorobenzene	53, 79, 93, 121, 143	375,543	61,363	.16	402
Diethyl-m-aminophenol	53				
Diethylaniline	30, 53, 76, 114, 152			1.35	32
1:5-Dihydroxy-anthraquinone	114				
1:5-Dihydroxy-4:8-dinitroanthraquinone-3:6-disulfonic acid.	116				
1:5-Dihydroxynaphthalene	69, 116, 117				
1:8-Dihydroxynaphthalene-3:6-disulfonic acid (chromotropic acid).	53, 114, 116				
Dimethylaniline	6, 24, 27, 53, 103, 114, X	390,931	210,910	.54	366
Di(1-naphthol-3-sulfonic)-urea	114				
Dinitroacetanilide	53				
Dinitroanthraquinone	114				
Dinitrobenzene	14, 24, 53, 114, 163	333,528	72,907	.22	884
m-Dinitrobenzene	111				
Dinitrochlorobenzene	14, 53, 69, 93, 114, 170			.24	2,408
p-Dinitrochlorobenzene	116				
Dinitrodibenzanthrone	116				
Dinitrohydroxyphenylamine	116				
Dinitronaphthalene	116				
Dinitrophenol, and sodium salt	14, 69				
2:6-Dinitrophenol-4-sulfonic acid	117				
Dinitrotoluene	14, 53, 55, 65, 72, 114, 116	182,229	41,566	.23	1,065
Diphenylamine	53				
Diphenylmethane and sulfonate	114				
Distilbene diphenol	114				
Ethyl acetanilide	114				
Ethyl-p-aminoacetanilide	114				
Ethyl-p-aminobenzoate	110				
Ethylbenzylaniline	30, 53, 76, 152, 164			.90	16
Ethylbenzylaniline sulfonic acid	30, 114				

E 5.—*Production and sales of coal-tar intermediates during 1921—Continued.*

ommon name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
ylaniline disulfonic acid	30, 64				
ene	116				
in	72, 114				
hyde-p-amino-dimethy-	X				
acid. (*See* 1-naphthy-3:6-disulfonic acid.)					
ide	145, X				
cid. (*See* 2-amino-8-l 6-disulfonic acid). (*See* 1-amino-8-naph-disulfonic acid.)					
y benzaldehyde	30				
y naphthoic acid	34, 53				
y naphthoic anilide	53				
y naphthoic toluide	53				
y phenyl arsonic acid ium salt.	47, 105				
ne blue RS	116				
acid. (*See* 1-naphthy-5-sulfonic acid.)					
acid	5, 53, 55, 72, 114, 117X	10,570	8,876	.84	50,647
e aniline	X				
e base	53				
e diphenyldiamine	X				
hydrol. (*See* Tetramethnobenzhydrol.)					
ketone, (*See* Tetramethinobenzophenone.)					
laniline	30, 53, 76, 114			1.70	27,479
ene, solidifying 79° C. e (refined, flake).	13, 17, 29, 99, 138, 143, 166, 174, X.	13,183,142	740,955	.06	13,553,777
ene-1:5-disulfonic acid	69				
ene-2:7-disulfonic acid	145				
ol	34, 72, 80, 114, 155			1.11	95,735
ol, tech	24, 27, 34, 53, 72, 130, 145.	2,263,601	891,029	.39	2,959,049
ol, U. S. P	24, 130				
ol-4-sulfonic acid (Nevinther's acid).	2, 24, 27, 34, 45, 53, 114, 116, 117.	6,680	8,173	1.22	182,595
ol-5-sulfonic acid	5, 53, 114, 116, 117			1.45	92,571
ol-3:8-disulfonic acid	2				
ol-3:6:8-trisulfonic acid	27, 53, 114, 116			.55	178,906
ol-1-sulfonic acid	56, 130				
ol-6-sulfonic acid (er's acid).	5, 34, 55, 69, 114, 116, 117.			.73	168,835
ol-7-sulfonic acid	34, 145				
ol-8-sulfonic acid	X				
ol-3:6-disulfonic acid	2, 22, 24, 27, 34, 53, 54, 69, 114, 116, 117, 145, 146, 160, 164.	66,968	43,323	.65	322,902
ol-6:8-disulfonic acid	22, 24, 27, 34, 53, 54, 114, 145.			.68	396,926
ylamine	17, 53, 93, 116			.34	429,035
ylamine	34, 53, 114, 130	28,642	32,453	1.13	102,079
ylamine-4-sulfonic acid ionic acid).	2, 27, 45, 53, 72, 93, 114, 116, 117, X.			.42	832,850
ylamine-5-sulfonic acid d's acid).	27, 53, 64, 69, 114, 117, 137.			.84	166,616
ylamine-6-sulfonic acid	53, 114				
ylamine-6 and 7-sul-id.	34, 116				
ylamine-8-sulfonic acid.	53, 64, 69, 114, 117, 137			.96	533,755
ylamine-2:4:8-trisul-id.	114				
ylamine-3:8-d i sulfonic	2, 34, 116				
ylamine-4:8-disulfonic	34, 114, 116			1.04	260,823
ylamine-3:6:8-t r i s u l-id.	22, 53, 69, 114, 116, 122			.51	2,026,003
ylamine-1-sulfonic acid.	5, 34, 56, 130, 145, X	38,736	60,689	1.57	149,014
ylamine-6-sulfonic acid er's acid).	34, 114, 116				
ylamine-4:8-disulfonic	116				

TABLE 5.—*Production and sales of coal-tar intermediates during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
2-Naphthylamine-5:7-disulfonic acid.	53, 114, 116				
2-Naphthylamine-6:8-disulfonic acid.	22, 53, 114, 116			1.11	247,357
Neville and Winther's acid, see 1-naphthol-4-sulfonic acid.					
p-Nitroacetanilide	34, 114, 145, X			.68	288,748
Nitro aminophenol	69, 167				
m-Nitroaniline	53, 163				
p-Nitroaniline	6, 22, 34, 53, 116, 144, 145, 157, X.	621,559	526,403	.85	832,438
p-Nitroaniline-o-sulfonic acid	5, 53, 64, 69, 145, 167			1.27	64,488
o-Nitroanisole	114, 116				
m-Nitrobenzaldehyde	114				
Nitrobenzene (oil of myrbane)	24, 27, 53, 114, 116, 134, X.	957,556	112,643	.12	7,443,196
Nitrobenzidine sulphate	116				
p-Nitrobenzoic acid	144				
m-Nitrochlorobenzene	14				
o-Nitrochlorobenzene	14, 112				
p-Nitrochlorobenzene	14, 53, 112, 114	119,495	27,202	.23	51,7[illegible]
p-Nitrochlorobenzene-o-sulfonic acid.	5, 53				
p-Nitrochlorobenzene-6-sulfonic acid.	145				
8-Nitro-1-diazo-2-naphthol-4-sulfonic acid.	22				
3-Nitro-4-hydroxy phenylarsonic acid.	47, 105, 110				
Nitronaphthalene	17, 53, 116				
2-Nitronaphthalene-4:8-disulfonic acid.	34				
o-Nitrophenol	8, 70, 163, 167	24,368	15,853	.65	30,[illegible]
p-Nitrophenol	8, 53, 112, 116, 163, 167			.72	86,[illegible]
2-Nitrophenol-4-sulfonic acid	117				
Nitrosobetanaphthol	X				
Nitrosodimethylaniline	24, 53, 70 93, 114, 116, 151.			.99	104,[illegible]
p-Nitrosodimethylaniline	114				
Nitrosophenol	14, 31, 69, 77, 93, 114, 157.			.58	111,[illegible]
Nitrosulfo anthrarufin	114				
Nitrotoluene	14, 34, 53, 55, 72, 116, X.			.13	2,342,[illegible]
o-Nitrotoluene	14, 53, 65, 114, 116, X.	39,054	3,337	.09	727,[illegible]
p-Nitrotoluene-o-sulfonic acid	5, 34, 64, 114, 116			.39	321,[illegible]
p-Nitrotoluene	14, 34, 53, 65, 114, 116, X.	35,886	19,185	.50	566,[illegible]
m-Nitro-p-toluidine	34, 53, 145	45,126	125,768	2.79	70,[illegible]
p-Nitro-o-toluidine	160				
Nitroxylene	24, 27, 34, 116			.14	191,[illegible]
Oxalylarsanilic acid	110				
Phenazine	93				
Phenol	17, 102, 143	292,645	41,617	.14	
Phenyl-a-naphthylamine	22, 53				
Phenyl-l-naphthylamine-8-sulfonic acid.	53, 64, 69, 114, 117, 137			.98	204,[illegible]
m-Phenylenediamine	8, 14, 24, 30, 53, 69, 111, 114, 116, 163.	96,777	102,919	1.06	301,[illegible]
m-Phenylenediamine sulfonic acid.	53				
p-Phenylenediamine	144, 145, 157	124,954	212,613	1.70	
Phenylglycine, sodium salt	114				
Phenyl hydrazine-p-sulfonic acid	24, 53				
Phthalamide	160				
Phthalic acid and anhydride	53, 112, X	202,471	79,162	.39	
Picramic acid	22, 24, 53, 114, X	35,706	23,858	.67	254,[illegible]
Primuline	64, 114, 126				
Quinoline yellow, base	114				
Resorcinol, U. S. P. and tech	114, 127, 139, X	33,268	59,696	1.79	33,[illegible]
Rosaniline	50				
Salicylic acid, U. S. P	52, 108, 112, 143, X	1,185,062	279,072	.24	1,722,[illegible]
Salicylic acid, tech	53, 108, 112, 143, X	131,532	25,725	.19	1,777,[illegible]
Schaeffer's acid. (*See* 2-naphthol-6-sulfonic acid).					

E 5.—*Production and sales of cal-tar intermediates during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
acid	6, 24, 27, 34, 53, 69, 72, 114, 163.	171,117	$41,636	$0.24	1,071,904
enzoic acid, chloride of	83				
enzoic acid and ammonalt.	83				
hyldiaminobenzhydrol r's hydrol).	53, 54, 64, 69, 114			2.25	58,582
thyldiaminobenzophe-Michler's ketone).	22, 53				
thyldiaminodiphenylne.	54, 64				
anilide	114, 134, 151, X, X, X	376,368	157,046	.42	1,185,462
and salts	53, 111, 114, 116				
disulfonic acid	X				
e sulfamide	70, 112				
e sulfamide	112				
e sulfochloride	112				
e sulfo ethyl ester	114				
e	53, 65, 114, X	148,107	38,128	.28	
ine	14, 53, 65, 114, 116, X	83,324	21,065	.25	208,505
ine	14, 34, 53, 65, 114, 116, X	92,347	52,985	.57	268,629
ne sulfonic acid	6, 53, 72, 114			.50	33,923
ine-o-sulfonic acid	34				
nediamine	8, 14, 53, 55, 69, 93, 114, 116.	147,259	167,796	1.14	621,359
nediamine sulfonic acid	114				
ediamine	14				
hane	114				
phthylamine-8-sulfonic	114				
ignanidine	114				
diphosphate	142				
and salt	24, 27, 34, 53, 114, 116	9,215	4,503	.49	119,218
ermediates	116				

LE 6.—*Comparison of the production of coal-tar intermediates, 1920 and 1921.*

Name.	Total production.	
	1921 quantity.	1920 quantity.
	Pounds.	*Pounds.*
al intermediates	70,899,912	257,726,911
de, tech	1,152,713	2,667,252
phenylenediamine (p-amino acetanilide)	84,742	97,275
o-benzene	49,763	152,310
2-naphthol-4-sulfonic acid	449,996	971,370
8-naphthol-3:6-disulfonic acid (H acid)	1,639,323	5,180,993
8-naphthol-6-sulfonic acid (Gamma acid)	218,717	418,456
phenol and hydrochloride	72,572	41,474
l	5,639,234	39,234,186
inone	125,358	539,619
hyde	66,365	702,543
e base and sulfate	328,577	2,183,583
of soda	381,154	812,193
ichol	17,152	38,807
hloride	473,296	1,246,412
nzene (mono)	1,692,624	4,829,142
acid	778	11,517
hlo-p-toluidine sulfonic acid	18,204	51,961
stilbene disulfonic acid	66,909	142,227
robenzene	402,289	465,292
uline	32,812	180,542
laniline	566,286	5,447,107
enzene	894,209	2,492,178
lorobenzene	2,408,472	5,947,791

TABLE 6.—*Comparison of the production of coal-tar intermediates, 1920 and 1921*

Name.	Total productio	
	1921 quantity.	19 quan
	Pounds.	*Pou*
Dinitrotoluene	1,065,323	1,
Ethylbenzylaniline	16,949	
Metanilic acid	50,647	
Naphthalene, solidifying 79° C. or above (refined flake)	13,553,777	30,
b-Naphthol, tech	2,959,049	11,
1-Naphthol-4-sulfonic acid (Neville & Winther's acid)	182,595	
2-Naphthol-6-sulfonic acid (Schaeffer's acid)	168,835	
2-Naphthol-3:6-disulfonic acid	322,902	1,
2-Naphthol-6:8-disulfonic acid	396,926	1,
a-Naphthylamine	429,035	5,
1-Naphthylamine-4-sulfonic acid (naphthionic acid)	832,850	3,
1-Naphthylamine-5-sulfonic acid (Laurent's acid)	166,616	
1-Naphthylamine-8-sulfonic acid	533,755	
1-Naphthylamine-3:6:8-trisulfonic acid	2,026,003	3,
2-Naphthylamine-1-sulfonic acid	149,014	
2-Naphthylamine-6:8-disulfonic acid	247,357	
p-Nitroacetanilide	288,748	
p-Nitroaniline	832,438	2,
Nitrobenzene (oil of myrbane)	7,443,192	53,
p-Nitrochlorobenzene	51,744	
p-Nitrophenol	86,216	
Nitrosodimethylaniline	104,690	
Nitrosophenol	111,681	
Nitrotoluene	2,342,098	6,
o-Nitrotoluene	727,177	2,
p-Nitrotoluene	566,551	2,
m-Nitro-p-toluidine	70,094	
Nitroxylene	191,840	1,
m-Phenylenediamine	301,169	
Picramic acid	254,904	
Resorcinol, U. S. P. and tech	35,483	
Salicylic acid, U. S. P	1,722,575	2,
Salicylic acid, tech	1,777,752	3,
Sulfanilic acid	1,071,904	1,
Tetramethyldiaminobenzhydrol (Michler's hydrol)	58,582	
Thiocarbanilide	1,185,462	2,
o-Toluidine	208,505	1,
p-Toluidine	268,629	
m-Tolylenediamine	621,359	
Xylidine and salt	119,218	1,

TABLE 7.—*Comparison of imports 1914 and 1921 with the production of dyes 1921, inclusive, by classes.*

Class.	1914 (fiscal year).		1917		1918	
	Imports.	Per cent of total.	United States production.	Per cent of total.	United States production.	P o
	Pounds.		*Pounds.*		*Pounds.*	
Acid	9,286,501	20.2	9,372,121	20.4	9,799,071	
Basic	3,002,480	6.5	2,073,043	4.5	2,879,639	
Direct	10,264,757	22.3	11,181,761	24.3	12,285,683	
Lake and spirit soluble	1,512,605	3.3	934,360	2.2	1,068,466	
Mordant and chrome	4,450,442	9.7	4,164,902	9.1	5,447,192	
Sulphur	7,053,879	15.4	15,588,222	33.9	23,698,826	
Vats (including indigo)	10,352,663	22.5	289,296	.6	3,281,337	
(a) Indigo	8,407,359	18.3	274,771	.55	3,083,888	
(b) Other vats	1,945,304	4.2	14,525	.05	197,449	
Unclassified	27,568	.1	2,368,541	5.0	4,232	..
Total	45,950,895	100.0	45,977,246	100.0	58,464,446	

7.—*Comparison of imports 1914 and 1921 with the production of dyes 1917 to 1921, inclusive, by classes*—Continued.

Class.	1919		1920			
	United States production.	Per cent of total.	United States production.	Per cent of total.	Imports.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
	12,195,968	19.2	17,741,538	20.1	733,405	21.5
	4,036,532	6.4	4,993,001	5.7	192,163	5.7
	14,444,934	22.8	19,882,631	22.5	571,581	16.8
d spirit soluble	1,813,199	2.8	2,205,281	2.5	17,527	.5
t and chrome	3,985,050	6.3	3,900,209	4.4	709,482	20.9
	17,624,418	27.8	20,034,500	22.7	229,140	6.7
cluding indigo)	9,252,982	14.6	19,338,099	21.9	932,464	27.4
Indigo	8,803,824	14.0	18,178,231	20.6	171,101	22.4
Other vats	389,158	.6	1,159,868	1.3	761,363	5.0
ified	49,111	.1	168,517	.2	16,820	.5
otal	63,402,194	100.0	88,263,776	100.0	3,402,582	100.0

Class.	1921			
	United States production.	Per cent of total.	Imports.	Per cent of total.
	Pounds.		*Pounds.*	
	7,751,698	19.87	1,319,222	34.72
	1,852,243	4.75	154,673	4.07
	6,787,634	17.40	388,715	10.23
d spirit soluble	697,444	1.79	38,090	1.00
t and chrome	3,773,438	9.67	632,285	16.64
	10,239,255	26.25	200,653	5.28
cluding indigo)	7,019,120	17.99	1,049,712	27.51
Indigo	6,673,968	17.11	70,975	1.87
Other vats	345,152	.88	978,737	25.64
ified	887,858	2.28	20,594	.55
otal	39,008,690	100.00	3,803,943	100.00

Exports of Domestic Dyes.

e Commerce Department reports exports of domestic "dyes and tuffs" under (1) "aniline dyes"; (2) "logwood extract"; (3) "all dyes and dyestuffs," and only the value of these groups is . In 1922, however, a new classification was adopted; coal-tar were grouped under coal-tar finished products, and were divided (1) "color lakes," and (2) "other colors, dyes, and stains."

e combined value of exports of "aniline dyes" and "all other " for 1921 was $6,270,139 compared with $29,823,591 for 1920, $15,728,499 for 1919. In other words, exports of domestic dyes 921 showed a decrease of 79 per cent as compared with the rts for the previous year. The total exports during 1917, one e early years when the domestic industry was first expanding its small pre-war size, were valued at $7,548,963, which is er than the 1921 exports.

e combined value of total exports of coal-tar "color lakes" and er colors, dyes, and stains" for the first three months in 1922 $973,316 compared with $2,432,764 for "aniline dyes" and other dyes and dyestuffs" for the first three months of the ious year. In quantity the exports during the first three months

of 1922 totaled 1,387,594 pounds. This great reduction in export trade may be attributed in part to the general business de sion; the chief cause, however, was the appearance of German in the principal foreign markets, such as China, India, and Ja with which the domestic producers have been unable to com As far back as 1919 the Tariff Commission pointed out in its Ce of Dyes and Coal-Tar Chemicals for that year that any deduct as to the competitive strength of the domestic industry base the large exports of 1919 and 1920 were not warranted, as domestic producers during that period met little competitio foreign markets in German colors. Subsequent developments borne out the accuracy of that statement, as indicated by the r decline in exports during 1921 and 1922.

TABLE 8.—*Domestic exports of dyes, by months, July, 1917, to March, 1922.*

Month.	1917			1918		
	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.	Aniline dyes.	All other dyes.[1]	To anili all
January				$893,760	$688,958	$1,
February				441,704	297,278	
March				552,285	526,400	1,
April				453,326	479,428	
May				626,204	447,808	1,
June				828,801	797,403	1,
July	$497,106	$576,579	$1,073,685	753,236	486,690	1,
August	304,768	644,949	949,717	695,472	530,133	1,
September	371,565	757,467	1,129,032	528,207	449,295	
October	623,586	695,489	1,319,075	816,377	532,841	1,
November	582,725	733,008	1,315,733	1,377,623	757,488	2,
December	1,122,468	639,253	1,761,721	662,616	643,097	1,
Total	3,502,218	4,046,745	7,548,963	8,629,611	6,636,909	15,

Month.	1919			1920		
	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.	Aniline dyes.	All other dyes.[1]	To anili all
January	$1,405,017	$755,382	$2,160,399	$917,574	$372,468	$1,
February	1,231,355	617,050	1,848,405	1,850,662	379,825	2,
March	492,291	278,591	770,882	2,648,615	850,695	3,
April	777,123	359,512	1,136,635	1,829,771	891,467	2,
May	585,970	239,744	825,714	2,180,606	817,713	2,
June	858,661	475,571	1,334,232	2,389,515	1,239,191	3,
July	574,274	267,425	841,699	1,770,780	947,411	2,
August	761,009	350,491	1,111,500	1,151,196	623,181	1,
September	785,497	557,005	1,342,502	2,114,915	551,113	2,
October	1,037,708	453,390	1,491,098	1,802,142	334,167	2,
November	887,710	300,041	1,187,751	2,006,534	211,465	2,
December	1,327,456	350,226	1,677,682	1,788,170	154,415	1,
Total	10,724,071	5,004,428	15,728,499	22,450,480	7,373,111	29,

[1] Commerce and Navigation lists under domestic exports of "dyes and dyestuffs"—"aniline "logwood extract," and "all other dyes and dyestuffs." Under this latter designation may be i both natural and coal-tar dyes. However, since logwood extract—shown separately—is the m portant natural dye exported from the United States, it may be assumed that a considerable po the exports under "all other dyes and dyestuffs" are coal-tar dyes.

TABLE 8.—*Domestic exports of dyes, by months, July, 1917, to March, 1922*—Contd.

Months.	Aniline dyes.	All other dyes.	Total aniline and other.
1921.			
January	$943,595	$349,114	$1,292,709
February	397,123	72,641	469,764
March	574,969	95,322	670,291
April	305,760	59,250	365,010
May	278,331	91,753	370,084
June	444,273	81,477	525,750
July	310,357	65,626	375,983
August	513,012	70,663	583,675
September	322,477	70,228	392,705
October	349,981	73,706	423,687
November	372,244	78,703	450,947
December	254,878	94,656	349,534
Total	5,067,000	1,203,139	6,270,139

Months.	Coal-tar dyes.					
	Color lakes.		Other colors, dyes, and stains.		Total color lakes and other.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1922.[1]	*Pounds.*		*Pounds.*		*Pounds.*	
January	5,059	$4,188	364,971	$325,048	370,030	$329,236
February	6,796	5,124	298,364	230,544	305,160	235,668
March	3,612	3,162	708,792	405,250	712,404	408,412
Total	15,467	12,474	1,372,127	960,842	1,387,594	973,316

[1] In 1922 a new classification was adopted grouping these products under "Color lakes" and "Other dyes and stains."

PRODUCTION OF DYES IN GERMANY.

Beginning with February, 1920, detailed statements of one-quarter of the monthly production (this portion is required to be reserved for optional purchases of the Allied and Associated Governments by the Peace Treaty, Annex VI, Part II) of dyes in Germany were made to the Reparations Commission. Copies of these monthly statements from February, 1920, to February, 1922, inclusive, have been received by the Department of State, which has given permission for their publication by the Tariff Commission. A summary of these reserve stocks, containing the monthly reserve for each class of dyes, according to application, is shown in Table 9.

TABLE 9.—*One-quarter of production in German dye plants[1] reserved for purch Allied and Associated Governments, February, 1920 to February, 1922.*

[Pounds.]

Group.	Classification of colors.	1920					
		February.	March.	April.	May.	June.	J
I	Alizarin red	28,629	100,347	79,070	124,401	241,194	
II	Indigo paste	33,203	124,258	306,371	338,318	291,294	
III	Vat colors, except Indanthrene Blue G. C. D	15,346	9,361	19,577	62,183	41,786	
IV	Indanthrene Blue G. C. D.	3,135	.....	3,307	9,489	11,329	
V	Alizarin colors other than red	17,240	22,862	40,622	54,643	92,022	
VI	Direct colors for cotton	262,123	346,301	400,221	451,138	541,534	
VII	Direct colors for diazotization	63,402	51,495	54,586	44,687	88,131	
VIII	Acid colors for wool	149,827	202,819	265,094	360,192	419,842	
IX	Chrome colors for wool	61,313	91,257	95,605	132,287	182,647	
X	Basic colors	19,912	44,374	72,289	106,555	124,035	
XI	Sulphur colors	163,822	149,452	235,423	190,515	305,979	
XII	Lake colors	56,958	164,229	156,163	150,085	170,742	
XIII	Intermediate products	1,539	12,599	85,527	89,672	.....	...
	Total	876,449	1,319,354	1,813,855	2,114,165	2,510,535	3,

Group.	Classification of colors.	1920					
		August.	September.	October.	November.	December.	m
I	Alizarin red	210,328	198,632	215,028	235,775	191,066	1,
II	Indigo paste	777,774	642,729	426,599	635,419	373,803	4,
III	Vat colors, except Indanthrene Blue G. C. D	54,828	62,608	84,366	88,440	66,938	
IV	Indanthrene Blue G. C. D.	9,370	16,043	1,131	3,554	21,867	
V	Alizarin colors other than red	69,612	88,658	58,440	59,698	42,306	
VI	Direct colors for cotton	573,004	593,694	666,239	648,946	600,257	5,
VII	Direct colors for diazotization	113,973	95,439	117,562	117,653	103,409	
VIII	Acid colors for wool	469,589	492,647	487,131	518,041	486,258	4,
IX	Chrome colors for wool	200,504	208,760	216,057	163,304	224,272	1,
X	Basic colors	144,595	163,661	151,145	139,805	164,207	1,
XI	Sulphur colors	291,832	285,804	262,744	276,510	320,659	2,
XII	Lake colors	110,838	73,565	92,690	91,661	79,668	1,
XIII	Intermediate products	.....	.....	.....	.....	.....	...
	Total	3,026,247	2,922,240	2,779,132	2,978,806	2,674,710	25,

Group.	Classification of colors.	1921			
		January.	February.	March.	m
I	Alizarin red	137,999	35,077	74,103	
II	Indigo paste	630,621	529,970	608,849	1,
III	Vat colors, except Indanthrene Blue G. C. D	50,150	69,754	53,797	
IV	Indanthrene Blue G. C. D	1,759	2,811	2,917	
V	Alizarin colors other than red	43,563	12,560	22,090	
VI	Direct colors for cotton	512,056	350,355	421,938	1,
VII	Direct colors for diazotization	132,239	52,589	52,128	
VIII	Acid colors for wool	479,602	358,821	390,547	1,
IX	Chrome colors for wool	154,342	98,764	106,751	
X	Basic colors	128,902	159,426	153,423	
XI	Sulphur colors	285,498	207,532	204,609	
XII	Lake colors	112,305	98,435	91,936	
XIII	Intermediate products	.....	.....	.....	...
	Total	2,669,096	1,976,094	2,183,088	6

[1] Peace Treaty, Annex VI, Part II.

TABLE 9.—*One-quarter of production in German dye plants [1] reserved for purchase of Allied and Associated Governments, February, 1920, to February, 1922*—Continued.

Group.	Classification of colors.	1921					
		April.	May.	June.	July.	August.	September.
I	Alizarin red	88,063	91,797	124,853	120,744	200,817	166,077
II	Indigo paste	366,405	556,210	474,174	552,056	526,110	411,325
III	Vat colors, except indanthrene blue G. C. D	86,949	110,001	97,483	86,550	95,547	84,802
IV	Indanthrene blue G. C. D	2,370	2,037	9,793	8,415	11,424	4,575
V	Alizarin colors other than red	18,322	16,698	32,491	35,904	25,335	23,325
VI	Direct colors for cotton	423,063	410,545	366,588	379,143	472,106	466,577
VII	Direct colors for diazotization	63,268	47,668	72,426	48,618	61,705	83,819
VIII	Acid colors for wool	430,140	390,589	401,991	365,609	353,545	381,451
IX	Chrome colors for wool	131,205	120,986	95,631	100,351	110,658	153,046
X	Basic colors	155,415	136,478	124,919	101,180	100,968	76,960
XI	Sulphur colors	252,771	255,745	277,676	331,292	308,794	389,939
XII	Lake colors	76,773	71,431	93,438	63,534	45,543	62,071
	Total	2,094,743	2,210,184	2,171,463	2,193,396	2,312,566	2,303,966

Group.	Classification of colors.	1921			1922	
		October.	November.	December.	January.	February.
I	Alizarin red	141,773	266,741	281,104	332,734	254,168
II	Indigo paste	425,475	394,235	671,856	634,808	703,808
III	Vat colors, except Indanthrene blue G. C. D	89,985	74,088	93,473	76,340	103,274
IV	Indanthrene blue G. C. D	8,212	4,685	2,205	2,205	
V	Alizarin colors other than red	16,219	26,524	26,978	33,336	32,388
VI	Direct colors for cotton	455,951	643,525	624,433	596,269	581,133
VII	Direct colors for diazotization	105,589	114,454	128,356	132,655	105,777
VIII	Acid colors for wool	404,546	538,526	573,456	601,208	570,828
IX	Chrome colors for wool	148,696	207,312	245,473	238,073	232,484
X	Basic colors	106,634	133,217	148,028	135,757	144,952
XI	Sulphur colors	480,305	534,970	573,853	525,361	573,325
XII	Lake colors	65,739	114,353	124,950	133,063	125,005
	Total	2,449,125	3,052,630	3,494,165	3,441,804	3,427,137

TABLE 10.—*Production and sales of dyes and other finished coal-tar products during 1921.*

[The number in the first column identifies the dye according to the 1914 edition of the Schultz tables. The second column gives the common name of the dye. The numbers in the third column refer to the numbered alphabetical list of manufacturers printed on page 70. An X signifies that the corresponding product was made by a manufacturer who did not consent to the publication of his identification number in connection therewith. Blanks in the fourth and fifth columns indicate that there were actual sales during 1921, but that the figures can not be published without revealing information in regard to the output of individual firms. The blank space in the seventh column indicates that there was actual production of the corresponding dyes in the United States during 1921, but that the figures can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the totals.]

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	Total finished coal-tar products		*Pounds.* 60,434,009	$47,996,514	$0.79	*Pounds.* 51,457,565
	NITROSO DYES.					
4	Naphthol green	5, 55, 70				
	NITRO DYES.					
7	Naphthol yellow S	70, 72, 80, 155, X	47,080	66,685	1.45	
8	Pigment chlorine	160				

[1] Peace Treaty, Annex VI, Part II.

TABLE 10.—*Production and sales of dyes and other finished coal-tar products duri 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Productio 1921 (quantity
			Quantity.	Value.	Average price per pound.	
	STILBENE DYES.		*Pounds.*			*Pounds.*
9	Direct yellow R	5, 6, 27, 34, 59, 64, 114, 116, 126.	200,245	$221,347	$1.07	153,5
10	Stilbene yellow	53, 59				
11	Chloramine orange G	5, 6, 59, 64, 114, 116	55,999	89,805	1.60	57,5
	PYRAZOLONE DYES.					
19	Fast light yellow	53, 129				
22	Xylene yellow	129				
23	Tartrazine	22, 24, 114, 129, 154, 155	526,425	945,817	1.80	559,1
	All other pyrazolone	114				
	AZO DYES.					
	Monoazo dyes.					
31	Spirit yellow	27, 114				
32	Butter yellow	6, 27, 38, 72, 114	22,584	25,605	1.13	18,5
33	Chrysoidine Y	27, 53, 69, 72, 114	343,872	263,521	.77	253,0
34	Chrysoidine R	14, 27, 53, 55, 69, 72, 114	65,931	51,642	.78	100,2
35	Sudan G	6				
36	Sudan I	27, 38, 72, 114	25,494	23,894	.94	
37	Croceine orange	34, 93, 114, 145				
38	Orange G	22, 24, 27, 53, 69, 114, 145 X X.	89,480	85,905	.96	91,7
40	Chromotrope 2 R	114, 116, X				
41	Fast acid fuchsine B	6, 27, 40, 114, 116	8,344	11,950	1.43	8,0
42	Amino naphthol red G	5, 30, 53, 64, 69, 114	83,931	122,445	1.46	61,1
48	Alizarin yellow G	5, 6, 24, 34, 40, 53, 69, 81, 93, 114, 117, 123, 171, X.	411,999	216,898	.53	271,3
55	Paranitraniline red	146				
57	Chromotrope 2 B	22				
58	Alizarin yellow R	5, 6, 24, 34, 40, 53, 69, 78, 81, 93, 116, 123, 145, 171.	114,302	79,250	.69	128,4
61	Victoria violet	64, 114, 116				81,
65	Azo coralline	64, 69				
66	Amino naphthol red 6 B	53, 64, 69, 114, 117	106,653	132,864	1.25	90,
67	Chromotrope 6 B	5, 114 X				
68	Spirit yellow R	6, 27, 38, 114	22,653	26,572	1.17	20,
71	Azo fuchsine B	30				
72	Pigment orange R	160				
73	Helio fast red	146				
76	Sudan II	6, 27, 38, 53, 72, 114	31,650	38,117	1.20	
82	Ponceau 2 R	5, 24, 27, 34, 72, 114, 145	248,059	180,856	.73	178,
83	Ponceau 3 R	114 X				
88	Acid anthracene brown R.	114				
89	Metachrome brown B	22, 24, 53 X				
94	Azo eosine C	116				
102	Diamond flavine G	22, 69, 117				
105	Sudan brown	6				
106	Autol red RLP	146				
107	Sulphamine brown A	145				
112	Bordeaux B	5, 24, 27, 34, 69, 72, 93, 114, 116, 145.	102,590	86,604	.84	84,
114	Chromotrope 10 B	116				
118	Geranine	59				
119	Diamine rose	20, 59, 114, 126	25,900	100,834	3.89	
134	Metanil yellow	34, 50, 53, 55, 69, 72, 114	181,411	218,060	1.20	90,
137	Acid yellow G	53, 55, 114	5,100	5,306	1.04	
138	Methyl orange	7				
139	Orange IV	155				
141	Azo yellow	53, 54, 55, 69, 114, 155	142,959	264,683	1.85	125,3
143	Tropaeoline	5, 72				
144	Orange I	27, 114, 155 X	20,520	87,550	4.27	28,9
145	Orange II	5, 6, 24, 27, 34, 38, 53, 69, 70, 72, 114, 119, 145.	995,844	504,993	.51	922,3
151	Orange R	6, 53, 72, 114				49,2
152	Permanent red 4 B	34				
153	Lake red C	97, 106, 145				
154	Palatine chrome brown	22, 114, 117	44,887	68,527	1.53	52,0
155	Acid alizarin garnet R	22, 114				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	AZO DYES—cont'd.					
	Monoazo dye—Cont'd.		*Pounds.*			*Pounds.*
156	Palatine chrome violet	22, 114				
157	Diamond black PV	69, 114				
159	Alizarin black R	22				
160	Fast brown N	69				
161	Fast red A	5, 20, 22, 24, 27, 34, 53, 64, 72, 93, 114, 125, 145, X.	204,538	$196,642	$0.96	120,251
163	Azo rubine	5, 27, 34, 53, 64, 69, 93, 114, 116, X.	374,429	471,776	1.26	232,216
164	Fast red VR	5, 114, 116, 117	112,542	220,433	1.96	144,957
166	Fast red E	5				
167	Crocein scarlet 3 BX	34				
168	Amaranth	27, 34, 53, 93, 114, 145, X	64,246	207,266	3.23	31,994
169	Cochineal red	24, 27, 53, 114, 145	115,968	114,936	.99	139,323
173	Lithol red R	34, 56, 114, 145, X	87,737	142,982	1.63	63,194
177	Mordant yellow	5, 6, 34, 114, X	36,721	36,073	.98	94,214
180	Eriochrome blue black B.	22, 69, 114	8,537	9,931	1.16	
181	Salicine black U	5, 22, 27, 34, 53, 64, 69, 93, 114, 116, 117, 145, X.	1,426,550	1,073,119	.75	1,523,220
183	Eriochrome black T	22				
184	Eriochrome black A	22				
186	Lanacyl violet B	53				
188	Sulphon acid blue R	5, 64, 69, 114	392,255	505,747	1.67	336,079
189	Sulphon acid blue B	114				
190	Alkali brown	126				
193	Stanley red	126				
194	Thiazine red R	34, 59, 116	15,042	44,728	2.97	15,229
195	Rosophenine SG	59, 126, X	12,509	26,280	2.10	
197	Thiazine red G	69, 126				
198	Mimosa C	20, 64, 126	2,835	5,745	2.02	3,517
199	Cotton yellow R	126				
200	Lake red D	160				
202	Palatine chrome red B	6, 53, 104, 114, 160	17,182	43,397	2.53	21,377
	All other monoazo dyes	22, 24, 69, 72, 114, 116, 117, 160, X, X.	685,121	822,191	1.20	696,466
	Total monoazo dyes		7,483,243	7,516,312	1.01	7,029,401
	Disazo dyes.					
211	Resorcin brown	5, 72, 114				9,428
212	Acid brown	X				
213	Fast brown	5, 6, 114				
217	Agalma black 10 B	5, 6, 22, 27, 34, 40, 53, 69, 78, 93, 114, 116, 123, 145, X.	1,687,811	1,851,862	1.09	1,436,194
223	Sudan III	27				
224	Cloth red G	34				
227	Brilliant croceine	5, 27, 93, 114, 145	82,442	128,217	1.56	34,463
228	Ponceau 5 R	27, 69				
230	Cloth red 3 G	53				
232	Sudan IV	6, 34, 38, 72, 114				
233	Cloth red B	6, 69				
234	Cloth red G	117				
235	Wool red B	114, 117, X	43,614	61,713	1.41	
246	Cloth scarlet G	55, 72				
247	Scarlet EC	55, 114				
257	Sulphocyanine	5, 53, 64, 69, 114, 117	381,809	665,866	1.74	365,998
263	Jet black R	114				
264	Fast sulphon black F	22, 69				
265	Sulphocyanine black	53, 64, 69, 114, 117	85,942	127,312	1.48	83,796
269	Naphthylamine black D.	5, 53, 69				
275	Diamond black	45, 114				
276	Diamond green	53				
278	Biebrich, patent black	116				
279	Benzo fast scarlet	53, 114				
283	Bismarck brown	14, 27, 38, 53, 69, 70, 72, 114.	159,341	124,739	.78	153,695

TABLE 10.—*Production and sales of dyes and other finished coal-tar products* 1921—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Prod
			Quantity.	Value.	Average price per pound.	(qu
	AZO DYES—cont'd.					
	Disazo dyes—Cont'd.		*Pounds.*			*Po*
284	Bismarck brown 2 R	27, 53, 55, 59, 69, 72, 114, 116.	517,065	$439,614	$0.85	
288	Palatine chrome black	117				
296	Benzo fast yellow	53				
297	Benzo fast pink 2 BL	53				
303	Paper yellow	53, 59, 114				
304	Chrysophenine G	6, 53, 59, 114, 116	155,880	316,208	2.03	
307	Congo red	53, 69, 93, 114, 116, 123, X.	238,099	213,342	.89	
311	Orange TA	114				
312	Congo Corinth G	5, 27, 45, 69, 114, 116				
320	Bordeaux	5, 34				
322	Trisulphon violet B	114, 116, 117				
323	Dianil blue R	126				
327	Diamine violet N	5, 6, 22, 27, 53, 93, 114, 116	22,984	49,896	2.17	
328	Diamine black R O	6				
333	Oxamine black BHN	5, 6, 22, 27, 53, 93, 114, 116, 126.	485,241	720,350	1.48	
336	Benzo cyanine R	114				
337	Benzo blue 2 B	5, 6, 12, 14, 22, 27, 34, 40, 53, 59, 78, 111, 114, 116, 123, X, X.	803,548	557,457	.69	
340	Benzo orange R	34, 53, 111, 116	22,214	19,117	.86	
341	Crumpsall direct fast red.	X				
342	Chrysamine G	6, 34, 40, 114, X	12,488	12,316	.99	
343	Diamine fast red F	5, 6, 22, 27, 53, 93, 114, 116, X.	49,946	104,558	2.09	
344	Diamine brown	5, 6, 22, 27, 53, 93, 114, 116, X.	106,924	176,040	1.65	
351	Cresotine yellow	45, 114				
355	Anthracene red	116				
362	Oxydiamine orange	114				
363	Benzopurpurine 4 B	5, 14, 27, 34, 53, 69, 78, 93, 114, 116.	249,847	300,100	1.20	
365	Benzopurpurine B	45				
375	Congo Corinth B	111				
377	Azo blue	38				
378	Trisulphon blue R	38, 116				
382	Azo mauve B	114				
385	Oxamine blue 4 R	114				
386	Benzo blue BX	34, 114, 116				
391	Benzo blue 3 B	5, 14, 27, 34, 93, 114, 116.	93,769	96,171	1.03	
392	Tolulylene orange G	114				
393	Diphenyl brown 3 GN	38				
394	Chrysamine R	14				
400	Acid anthracene red	X				
403	Diamine black BO	6				
405	Benzopurpurine 10 B	53, 114, 116	9,954	23,199	2.33	
410	Benzazurine G	53, 114, 116	54,266	82,985	1.53	
415	Dianil blue G	116				
419	Chicago blue RW	114, 116				
421	Oxamine blue B	114				
424	Chicago blue 6 B	53, 114, 116				
426	Benzamine pure blue	53, 78, 114, 116	198,596	275,570	1.39	
	All other disazo dyes	14, 40, 53, 72, 114, 116, 117, 168, X, X.	280,665	416,697	1.48	
	Total disazo dyes		6,581,028	7,965,982	1.21	5,5
	Trisazo dyes.					
436	Columbia black	53, 114				
441	Diazo blue black RS	114				
462	Direct deep black EW	5, 6, 12, 22, 34, 40, 45, 53, 114, 123, X.	4,073,425	3,225,152	.79	2,2
463	Erie direct black RX	34, 45, 53, 111, 114, 116, 123.	335,508	239,572	.71	2
464	Erie direct green ET	5, 6, 40, 45, 114	71,505	85,774	1.20	
470	Chloramine green B	5, 116				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	AZO DYES—cont'd.					
	Trisazo dyes—Cont'd.		*Pounds.*			*Pounds.*
471	Chloramine blue 3 G	116				
473	Diamine black HW	126				
474	Oxamine green B	5, 6, 12, 34, 53, 78, 114, 116, 123.	212,232	$257,467	$1.21	155,753
475	Oxamine green G	14, 34, 45, 53, X	100,228	103,010	1.03	62,028
476	Benzamine brown 3 GO	6, 34, 59, 114, 116, 123, X	544,933	624,377	1.15	491,347
477	Congo brown G	5, 6, 53, 69, 114, 116, 126, X.	193,466	279,812	1.45	213,403
480	Congo brown R	5				
	All other trisazo dyes	40, 53, 78, 111, 114, 116	307,429	464,237	1.51	353,154
	Total trisazo dyes		5,928,274	5,397,135	.91	3,885,557
	Tetrakisazo dyes.					
485	Benzo brown G	14, 45, 53, 59, 69, 116	59,349	63,188	1.06	53,326
487	Benzo brown B	27, 45, 59, 116	38,633	44,291	1.15	41,289
	All other tetrakisazo dyes.	126				
	All other azo dyes	5, 6, 14, 22, 30, 34, 38, 53, 59, 64, 69, 78, 93, 116, X.	459,479	583,712	1.27	519,815
	Total azo dyes		20,551,196	21,572,485	1.05	17,062,366
	DIPHENYLMETHANE DYES.					
493	Auramine	38, 53, 103	152,326	308,454	2.02	94,484
	TRIPHENYLMETHANE DYES					
495	Malachite green	40, 50, 70, 103, 114	88,664	174,727	1.97	
497	New fast green 3 B	53				
498	Turquoise blue	64				
499	Brilliant green	103, 114				
502	Guinea green	30, 53, 114	46,808	184,262	3.94	
503	Brilliant milling green B	114				
505	Light green	114				
506	Erioglaucine	114				
511	Para-fuschsine	114				
512	Magenta (or fuchsine)	34, 50, 53, 70, 72, 82, 114, 133, 145, 157, X.	68,210	223,548	3.28	49,797
513	New fuchsine O	114				
515	Methyl violet	34, 50, 53, 72, 77, 114, 119, 157.	256,729	426,822	1.66	190,643
516	Crystal violet	22, 53				
517	Methyl violet 5–B	114				
521	Aniline blue	34, 70, 72, 133, X	56,955	165,645	2.91	87,464
524	Acid magenta	34, 82				
528	Fast acid violet 10 B	30, 53, 64	11,712	34,213	2.92	
530	Acid violet	30, 53, 64, 114	70,366	256,420	3.64	43,043
531	Eriocyanine	114				
536	Alkali blue	34, 50, 72, 82, 114, 119, 133, 145, 157, X.	49,145	168,133	3.42	73,596
538	Methyl blue for cotton	82				
539	Soluble blue	34, 50, 82, 114, 119	21,669	90,576	4.18	22,356
543	Patent blue	114				
545	Patent blue A	30, 114				
548	Acid violet 6 BN	53				
558	Victoria blue R	53				
	All other triphenylmethane dyes.	22, 53, 114				
	Total triphenylmethane dyes.		786,845	2,153,636	.27	722,421

TABLE 10.—*Production and sales of dyes and other finished coal-tar products du 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Produc 192 (quan
			Quantity.	Value.	Average price per pound.	
	DIPHENYLNAPHTHYLMETHANE DYES.		*Pounds.*			*Poun*
559	Victoria blue B	22, 53				
565	Acid blue B	54				
566	Wool green S	53, 54, 64, 69, 114, 117	166,338	$312,483	$1.88	16
571	Rhodamine 6 G	53, 133				
	XANTHONE DYES.					
573	Rhodamine B	53				
580	Fast acid violet B	53				
582	Fast acid violet A 2 R	53				
585	Uranine	53, 72				
587	Eosine	53, 70, 72, 119, X	46,492	116,579	2.51	6
589	Eosine FP	53				
592	Erythrosine	53, 72, 114, 119, X	6,282	48,514	7.72	
593	Phloxine P	53				
595	Rose bengale	53				
597	Rose bengale B	72				
599	Galleine	173				
600	Coerulein	173				
	All other xanthone dyes	119				
	Total, xanthone dyes.		103,843	383,629	3.69	12
	ACRIDINE DYES.					
606	Phosphine	72, 114				
	QUINOLINE COLORING MATTER.					
613	Quinoline yellow	114				
	THIOBENZENYL DYES.					
615	Thioflavine S	126				
616	Primuline	20, 53, 64, 114, 126, X	168,404	230,922	1.37	12
617	Columbia yellow	20, 64, 114, 116, 126	114,663	181,745	1.59	8
	OXAZINE AND THIAZINE DYES.					
622	Delphine blue B	6, 40, 114, 117, X	27,027	61,053	2.26	
626	Gallocyanine	5, 6, 24, 40, 114, 173	136,879	333,780	2.44	14
631	Chromocyanine V	114				
649	Cotton blue or Meldola's blue.	6, 27, 93, 114	28,110	59,675	2.12	3
659	Methylene blue	24, 40, 53, 70, 114, 136, 170.	256,550	497,136	1.94	20
660	Methylene green	114				
667	Brilliant alizarine blue	64, 69				
	AZINE DYES.					
670	Neutral red	7				
672	Azo carmine	53				
679	Safranine	53, 70, 114, 136	78,371	204,454	2.60	3
680	Methylene violet	77				
681	New fast gray	24, 38, 116				
683	Safranine MN	114				
697	Induline (spirit soluble).	20, 27, 34, 38, 69, 72, 114	50,986	38,346	.75	5
698	Nigrosine (spirit soluble).	20, 24, 27, 38, 69, 72, 114, 117	101,559	70,800	.70	16
699	Induline (soluble in water).	20, 69, 72, 114	102,929	98,932	.96	9
700	Nigrosine (soluble in water).	20, 24, 69, 72, 114, 117	846,537	571,798	.68	62
	All other azines	114				

BLE 10.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

...nitz ...o.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	SULPHUR DYES.		*Pounds.*			*Pounds.*
720	Sulphur black	14, 38, 40, 53, 69, 75, 93, 114, 170, 171.	9,277,525	$2,156,525	$0.23	7,832,696
	Sulphur blue	14, 19, 40, 53, 69, 77, 93, 114, 116, 157.	544,931	351,424	.64	190,621
	Sulphur brown	6, 34, 38, 40, 41, 53, 69, 77, 93, 158.	997,581	384,366	.38	1,159,115
	Sulphur green	38, 40, 41, 53, 69, 77, 93.	56,916	46,619	.82	70,428
	Sulphur maroon	40, 53, 93, 172.	179,882	170,387	.95	230,773
	Sulphur olive	40, 41, 69, 93, 172.	42,059	19,967	.47	55,920
	Sulphur orange	40, 69, 114.				
	Sulphur tan	14, 34, 41, 69, 172.	86,788	51,568	.59	121,390
	Sulphur yellow	14, 40, 41, 53, 172.	303,766	220,745	.73	316,399
	All other sulphur dyes	114.				
	Total, sulphur dyes.		11,827,181	3,687,466	.31	10,239,255
	ANTHRAQUINONE DYES.					
763	Indanthrene dark blue BO.	10, 53, 116.				36,971
765	Indanthrene green B	53, 116.				
767	Indanthrene violet RR	53.				
778	Alizarin	19, 53, 114.	34,236	22,258	.65	
779	Alizarin orange	114.				
782	Alizarin brown	40, 53, 160, 173.	39,907	52,653	1.32	59,613
784	Alizarin SX	114.				
789	Anthracene blue WR	19, 114.				
814	Algol yellow WG	10.				
817	Algol yellow R	10.				
819	Algol red R	10.				
836	Indanthrene blue	53, 116.				
842	Indanthrene blue GCD	53, 116.				
849	Indanthrene yellow	53, 116.				
858	Alizarin saphirol B	69, 114.				
867	Indanthrene brown B	116.				
	All other anthraquinone dyes.	59, 116, 173.				
	INDIGO AND ITS DERIVATIVES.					
874	Indigo, synthetic	52, 53, 114.	9,413,308	4,257,572	.45	6,673,968
877	Indigo extract	5, 15, 53, 98, 114, 157.	723,025	472,253	.65	585,931
879						
880	Brom indigos	52.				
883						
	ANILINE BLACK GROUP.					
922	Aniline black	145.				
923	Ursol	53, 66, 157.				
	Total aniline black dyes.		103,267	202,704	1.96	107,890
	FOOD DYES.					
22	Tartrazine	24, 164.				
83	Ponceau 3 R	24.				
144	Orange I	24.				
168	Amaranth	24, 164.				
505	Light green SF (yellowish).	164.				
592	Erythrosine	24.				
877	Indigo disulfonic acid	24.				
	Yellow AB	6, 72.				
	Yellow OB	72.				
	PHOTOCHEMICAL DYES.					
	Alizarin yellow R	58.				
	Ethyl orange	58.				
	E. yellow	58.				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	PHOTOCHEMICAL DYES—continued.		*Pounds.*			*Pounds.*
	p-Hydroazobenzenesulfonate.	58				
	Methyl orange	58				
	Methyl red	58				
	Orthochrome	58				
	Pinacyanol	58				
	Propyl red	58				
	Resorcin yellow	58				
	Bacteriological stains... Biological stains and indicators.	36, 68, 83, 95, 169	157	$15,717	$101.17	
	Total dyes		47,513,762	39,283,956	.83	39,008,690
	COLOR LAKES.					
	Black lakes	5, 40, 53, 73, 146, 168, X.	266,877	33,793	.13	242,095
	Blue lakes	11, 21, 32, 40, 53, 57, 60, 73, 84, 90, 94, 104, 140, 146, 147, 148, 149, 160, 168, X, X, X, X, X, X, X, X.	347,620	228,091	.66	360,807
	Brown lakes	32, 48, 53, 60, 73, 90, 146, 147, 159, X, X, X.	27,225	3,576	.13	27,986
	Eosine lakes	11, 21, 32, 48, 57, 60, 73, 84, 90, 104, 140, 145, 146, 147, 148, 149, X, X, X, X, X, X, X, X, X.	314,973	243,029	.77	309,326
	Green lakes	11, 21, 32, 48, 53, 57, 73, 84, 90, 94, 104, 146, 147, 148, 149, 168, X, X, X, X, X, X, X, X, X.	195,294	83,316	.43	200,924
	Lithol red lakes	11, 21, 48, 53, 60, 73, 84, 90, 92, 96, 104, 130, 140, 145, 146, 147, 149, 159, 168, X, X, X, X, X, X, X, X, X.	288,320	238,939	.83	277,733
	Maroon lakes	11, 21, 32, 48, 53, 57, 73, 84, 90, 92, 100, 101, 104, 145, 146, 168, X, X, X, X, X, X.	552,570	207,817	.38	360,775
	Orange lakes	11, 21, 32, 48, 53, 57, 60, 73, 90, 94, 96, 104, 140, 146, 147, 148, 160, 168, X, X, X, X, X, X, X, X.	260,964	82,169	.31	233,818
	Para red	11, 21, 40, 48, 57, 73, 84, 90, 92, 96, 100, 101, 104, 145, 146, 149, 160, 165, 168, X, X, X, X, X, X, X, X, X.	2,049,372	621,985	.30	1,925,017
	Red lakes	11, 21, 32, 48, 53, 57, 60, 73, 94, 96, 101, 104, 107, 140, 146, 147, 148, 149, 159, 160, 165, X, X, X, X, X, X, X, X, X, X, X.	1,045,004	516,755	.49	1,002,749
	Scarlet lakes	11, 21, 32, 48, 53, 57, 60, 73, 84, 90, 96, 100, 101, 140, 145, 146, 148, 149, 159, 160, 165, 168, X, X, X, X, X, X, X, X, X.	471,226	177,466	.38	438,115
	Violet lakes	11, 21, 32, 48, 53, 57, 60, 73, 84, 90, 94, 96, 104, 140, 146, 147, 148, 149, 168, X, X, X, X, X, X, X, X.	178,311	202,859	1.14	182,021

ABLE 10.—*Production and sale of dyes and other finished coal-tar products during 1921*—Continued.

Schedule No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921. Quantity.	Sales, 1921. Value.	Sales, 1921. Average price per pound.	Production, 1921 (quantity).
	COLOR LAKES—contd.					
	Yellow lakes	11, 48, 53, 60, 73, 84, 90, 94, 104, 145, 146, 147, 148, 149, 168, X, X, X, X, X, X, X, X.	*Pounds.* 202,911	$104,048	$0.51	*Pounds.* 190,988
	All other lakes	X				
	Total color lakes		6,424,612	2,863,189	.45	6,152,187
	PHOTOGRAPHIC CHEMICALS.					
	p-Aminophenol hydrochloride.	31				
	Diaminophenol hydrochloride.	167				
	Hydroquinone	139-173				
	p-Hydroxyphenylglycine.	58				
	Methyl p-aminophenol sulphate (metol).	58-139				
	Total, photographic chemicals.		170,221	248,041	1.46	183,798
	MEDICINALS.					
	Acetanilide	3, 108, 112, 120, 131, X.	243,655	70,053	.29	207,433
	Acetphenetidin	X				
	Acriflavine (3:6 diamino 10 methyl acridine chloride).	1-162				
	Ammonium benzoate	144				
	Ammonium salicylate	X				
	Arsphenamine	47, 49, 105, 110	694	281,841	406.11	670
	Aspirin (acetylsalicylic acid).	18, 52, 112, X, X	935,964	686,264	.73	733,510
	Benzocaine or anesthesine (ethyl p-amino benzoate).	1, 24, 110, 144	910	18,010	19.79	
	Benzyl benzoate	7, 61, 108, 162	10,702	16,700	1.56	
	Benzyl succinate	144, 175, X				
	Bismuth betanaphthol	108, 131				
	Bismuth tribromophenol.	108, 120				
	Caffeine sodium benzoate.	144				
	Chlorocosane	112				
	Chloramine T (sodium p-toluene sulfo-chloramide).	26, 112				
	Cinchophen (phenyl cinchoninic acid).	1, 24				
	Creosote carbonate	24, 53, 116, 129				
	p-Cresol benzoate	144				
	Cresol	116				
	Dibromohydroxy mercury fluorescein, sodium salt	83				
	Dichloramine T (p-toluene sulfone dichloramide).	24, 112				
	Guaiacol benzoate	144				
	Guaiacol carbonate	53				
	Guaiacol crystals	53, 116				
	Guaiacol liquid	53, 116				
	Halozone (p-sulfone dichlor amido benzoic acid).	112				
	Hydroxy-quinolin and sulphate.	91				
	Lithium benzoate	144, X				
	Magnesium salicylate	X				
	Mercuric benzoate	144				
	b-Naphthol benzoate	24, 61, 108	1,831	4,945	2.70	

TABLE 10.—*Production and sale of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	MEDICINALS—contd.		*Pounds.*			*Pounds.*
	Neoarsphenamine	47, 110				
	Novaspirin (methylene citryl salicylic acid).	X				
	Other salicylates	131				
	Phenacaine (ethenyl-p-diethoxydiphenyl amidine hydro chloride.)	110				
	Phenolphthalein	X				
	Phenolsulfonates (calcium, sodium, zinc, etc.).	1, 24 102, 108, 131	64,923	$16,581	$0.26	28,408
	Phenolsulfonphthalein	68, 83				
	Phenoltetrachlorophthalein.	83				
	Potassium hydroxyquinolin sulphate.	91				
	Procaine (p-aminobenzoyldiethylamino-ethanol).	1, 110				
	Proflavine (3:6 diamino acridine sulfate).	1				
	Salicaine (salicyl alcohol).	24				
	Salol, U. S. P. (phenyl salicylate).	108, 112, X	36,200	32,451	.90	
	Salophen (acetyl-p-animo phenol salicylate).	18				
	Silver arsphenamine	110				
	Sodium cinnamate	X				
	Sodium salicylate	52, 108, 112, 131, 143, X	352,250	100,968	.29	319,350
	Strontium salicylate	X				
	Tolysin (p-methylphenylcinchoninic acid ethyl ether).	24				
	All other medicinals	85				
	Total medicinals		1,876,246	2,930,324	1.56	1,545,917
	FLAVORS.					
	Benzaldehyde	X				
	Coumarin	X, X, X	53,525	220,371	4.12	52,097
	Ethyl benzoate	61, 63, 144, 150, 162, X, X.	4,937	10,367	2.10	5,551
	Ethyl cinnamate	61, 63, 89, 150, 162, X	2,341	10,085	4.31	
	Ethyl salicylate	61, 63, 150				
	Iso-butyl phenyl acetate	61				
	Methyl cinnamate	61,63,89,150,162, X, X.	2,846	13,047	4.59	2,786
	Methyl salicylate	52, 63, 108, 143, 150, X, X, X.	626,718	214,391	.34	640,943
	Phenyl propyl acetate	61				
	Saccharin (benzosulfinide).	2 6, 139, X, X				
	Total flavors		933,662	1,002,018	1.07	901,245
	PERFUME MATERIALS.					
	Acetophenone	61, 63, 89, 150	187	1,000	5.37	165
	Amyl phenyl acetate	X				
	Amyl salicylate	61, 63, 150, X, X	6,831	9,746	1.43	3,327
	Anbepine (anisic aldehyde).	61, 62, 63, 89, 150, X	2,211	9,602	4.36	2,197
	Benzophenone	151				
	Benzyl acetate	7, 61, 63, 89, 150, 162, X	9,331	10,855	1.16	7,191
	Benzyl benzoate	1, 7, 61, 63, 89, 108, 144, 150, 162, X, X.	13,546	19,165	1.41	13,789
	Benzyl butyrate	61, 89				
	Benzyl cinnamate	89, 150				
	Benzyl formate	150, X				
	Benzyl phenylacetate	150				

BLE 10.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 70).	Sales, 1921.			Production 1921 (quantity).
		Quantity.	Value.	Average price per pound.	
PERFUME MATERIALS.—continued.		*Pounds.*			*Pounds.*
Benzyl propionate	61, X				
Benzylidene acetone	150, X				
Bromstyrol	61, 89, 150, 162, X	306	$1,330	$4.35	252
Cinnamic acid	X				
Cinnamic alcohol	89				
Cinnamic aldehyde	61, 62, 63, 150, X	4,388	23,183	5.28	4,977
Diethyl phthalate	61, 63, 89, 150, 162, X	65,360	58,660	.90	73,937
Dimethyl anthranilate	150				
Diphenylmethane	89, 150, 162				
Diphenyl oxide	89, 150, X				
Ethylphenyl acetate	X				
Iso-butyl benzoate	X				
Iso-butyl salicylate	150				
Methyl anthranilate	61, 63, 89, 150, 162, X	947	4,611	4.88	655
Methyl benzoate	61, 63, 144, 150, 162, X, X, X.	1,782	2,421	1.36	2,176
Methyl guaiacol	150				
Methyl para cresol	150				
Methylphenyl acetate	X				
Nerolin (b-naphthol ethyl ether).	63, 150, X				
Phenylacetic aldehyde	61, 63, 89, 150, 162, X	901	11,843	13.15	822
Phenylethyl acetate	61, 89, 150, X	44	660	15.00	
Phenylethyl alcohol	61, 63, 89, 150, 162	140	1,584	11.31	157
Phenylpropyl acetate	X				
Phenylpropyl alcohol	X				
Salicylic aldehyde	63				
Yara yara (b-naphthol methyl ether).	63, X				
Total perfumes		119,691	175,815	1.47	119,335
SYNTHETIC PHENOLIC RESINS.					
Derived from coumarone.	17				
Derived from cresol	135, X, X				
Derived from phenol	135, X, X	493,899	649,951	1.32	495,152
Total resins		1,674,456	1,352,166	.81	1,643,796
SYNTHETIC TANNING MATERIALS.					
Barretan	17				
Liberty extract	93				
Synex	X				
Total tanning materials.		1,721,359	141,005	.08	1,902,597

TABLE 11.—*Comparison of production of dyes and other finished coal-tar product and 1921.*

Schultz No.	Product.	Total produc	
		1921, quantity.	qu
		Pounds.	*P*
	Total finished coal-tar products	51,457,565	112
	STILBENE DYES.		
9	Direct yellow R	153,347	
11	Chloramine orange G	57,582	
	PYRAZOLONE DYES.		
23	Tartrazine	539,134	
	AZO DYES.		
	Monoazo dyes.		
32	Butter yellow	18,521	
33	Chrysoidine Y	253,693	
34	Chrysoidine R	100,246	
38	Orange G	91,783	
41	Fast acid fuchsine B	8,084	
42	Amino naphthol red G	61,433	
48	Alizarin yellow G	271,285	
58	Alizarin yellow R	128,080	
60	Amino naphthol red 6 B	90,790	
82	Ponceau 2 R	178,272	1,
112	Bordeaux B	84,754	
134	Metanil yellow	90,385	
144	Orange I	28,981	
145	Orange II	922,326	1,
161	Fast red A	120,251	
163	Azo rubine	232,216	
168	Amaranth	31,994	
169	Cochineal red	139,323	
181	Salicine black U	1,523,220	1,
188	Sulphon acid blue R	330,079	
202	Palatine chrome red B	21,377	
	All other monoazo dyes	696,466	
	Total monoazo dyes	7,029,401	11,
	Disazo dyes.		
217	Agalma black 10 B	1,426,194	2,
227	Brilliant croceine	34,463	
283	Bismark brown	153,695	
284	Bismark brown 2 R	557,753	
303	Paper yellow	8,223	
304	Chrysophenine G	202,303	
307	Congo red	207,665	1,
333	Oxamine black BHN	281,852	
337	Benzo blue 2 B	571,217	1,
340	Benzo orange R	21,332	
342	Chrysamine G	13,328	
343	Diamine fast red F	35,782	
344	Diamine brown	69,610	
363	Benzopurpurine 4 B	152,626	
	All other disazo dyes	233,880	
	Total disazo dyes	5,531,363	12,
	Trisazo dyes.		
462	Direct deep black EW	2,229,842	7,
463	Erie direct black RX	298,516	2,
474	Oxamine green B	155,753	
475	Oxamine green G	62,028	
476	Benzamine brown 3 GO	491,347	
477	Congo brown G	213,403	
	All other trisazo dyes	353,154	
	Total trisazo dyes	3,885,557	11,
	Tetrakisazo dyes.		
485	Benzo brown G	53,326	
	All other azo dyes	519,815	
	Total azo dyes	17,062,366	36,

TABLE 11.—*Comparison of production of dyes and other finished coal-tar products, 1920 and 1921*—Continued.

Schultz No.	Product.	Total production.	
		1921, quantity.	1920, quantity.
	TRIPHENYLMETHANE DYES.	*Pounds.*	*Pounds.*
512	Magenta (or fuchsine)	49,797	284,285
515	Methyl violet	190,643	600,873
520	Acid violet	43,043	144,207
536	Alkali blue	73,596	74,253
539	Soluble blue	22,356	98,770
	Total triphenylmethane dyes	722,421	2,482,169
	DIPHENYL-NAPHTHYL-METHANE DYES.		
566	Wool green S	164,581	212,362
	XANTHONE DYES.		
587	Eosine	69,073	85,489
592	Erythrosine	6,644	6,874
	Total xanthone dyes	126,925	215,044
	THIOBENZENYL DYES.		
616	Primuline	129,281	183,179
617	Columbia yellow	86,418	100,248
	OXAZINE AND THIAZINE DYES.		
826	Gallocyanine	140,064	70,169
920	Methylene blue	209,395	577,264
	AZINE DYES.		
670	Safranine	52,771	149,629
687	Induline (spirit soluble)	55,339	140,400
688	Nigrosine (spirit soluble)	168,402	919,242
699	Induline (soluble in water)	92,988	168,048
700	Nigrosine (soluble in water)	626,706	2,743,021
	SULPHUR DYES.		
720	Sulphur black	7,832,696	16,305,037
	Sulphur blue	190,621	1,514,811
	Sulphur brown	1,159,115	1,269,731
	Sulphur green	70,428	177,927
	Sulphur maroon	230,773	133,407
	Sulphur olive	55,920	129,582
	Sulphur tan	121,390	95,038
	Sulphur yellow	316,399	408,967
	Total sulphur dyes	10,239,255	20,034,500
	ANTHRAQUINONE DYES.		
732	Alizarin brown	59,613	42,840
	INDIGO AND ITS DERIVATIVES.		
874	Indigo, synthetic	6,673,968	18,178,231
877	Indigo extract	585,931	1,395,000
	Total dyes	39,008,690	88,263,776
	COLOR LAKES.		
	Black lakes	242,005	382,277
	Blue lakes	360,807	645,647
	Brown lakes	27,986	113,630
	Eosine lakes	309,326	606,618
	Green lakes	200,924	431,970
	Lithol red	277,733	496,600
	Maroon lakes	360,775	740,765
	Orange lakes	233,818	339,275
	Para red lakes	1,925,017	970,389
	Red lakes	1,002,749	4,410,797
	Scarlet lakes	438,115	783,011
	Violet lakes	182,021	336,969
	Yellow lakes	190,988	536,122
	Total color lakes	6,152,187	10,983,538
	Total photographic chemicals	183,798	440,759

TABLE 11.—*Comparison of production of dyes and other finished coal-tar products, 1920 and 1921*—Continued.

Schultz No.	Product.	Total production.	
		1921, quantity.	1920, quantity.
	MEDICINALS.	*Pounds.*	*Pounds.*
	Acetanilide	207,433	1,255,140
	Arsphenamine	670	605
	Aspirin (acetylsalicylic acid)	733,510	1,708,436
	Phenolsulfonates (calcium, sodium, zinc, etc.)	28,408	181,516
	Sodium salicylate	319,350	450,764
	Total medicinals	1,545,917	5,184,989
	Total flavors	901,245	166,884
	PERFUME MATERIALS.		
	Acetophenone	165	742
	Amyl salicylate	3,327	14,982
	Total synthetic phenolic resins	1,643,796	4,659,680

PRICES OF DOMESTIC DYES.

The following table (No. 12) contains a comparison of the domestic sales prices of dyes for the years 1917 to 1921, inclusive, together with the invoice value for the same dyes imported during the year 1914. The colors included in this table represent about 80 per cent of the domestic production of dyes in 1920 and 73 per cent of the 1921 output. It should be pointed out that the domestic sales prices are not directly comparable with the invoice values in 1914. The latter values do not represent the cost to the consumer as the importer's profit should be added to these figures, and in most cases the invoice value does not include "charges for containers and packing, freight, and insurance to seaport, consular certification, minor shipping charges at point of departure and at seaport."

Column 1 contains the Schultz number as indicated in "Farbstoff-Tabellen," by Gustav Schultz, 1914 edition.

Column 2 contains the common name of the dye as adopted by the Tariff Commission for designating all dyes reported under a given Schultz number (column 1).

Column 3 contains the domestic sales price reported to the Tariff Commission. This represents the weighted average price of all manufacturers for those dyes reported under a given Schultz number. Most of these prices were published in the "Census of Dyes and Coal-Tar Chemicals, 1917, 1918, 1919, and 1920."

Column 4 shows the invoice price (1914), which represents the weighted average for all dyes classified under a given Schultz number in "Artificial Dyestuffs Used in the United States," Department of Commerce, Special Agents Series No. 121, by Thomas H. Norton. These invoice prices are considerably below the price at which these dyes were sold to the consumer in this country. This weighted average value for all types is usually higher than the invoice price per pound for those dyes representing the bulk of the importation under a given Schultz number. An examination of the individual dyes imported under given Schultz numbers in the Norton Census

shows a wide variation in prices, frequently amounting to several hundred per cent. This is chiefly due to the great variation in the concentration of the different dyes and also to the variation in prices of special and pure brands, which are more costly than the ordinary brands.

The average price of all dyes produced in 1917 was $1.26 per pound; for 1918, $1.07 per pound; for 1919, $1.07 per pound; for 1920, $1.08, and for 1921, $0.83 per pound. The tendency has been to reduce both the cost of production and sales price of dyes produced in the United States.

Such reductions have occurred notwithstanding the yearly development and production of new colors of greater value and complexity. These have tended to increase the average value per pound of all dyes produced.

TABLE 12.—*Domestic prices of dyes, 1917 to 1921, compared with invoice values, 1914.*

(1) Schultz No.	(2) Name of dye (weighted average of all dyes).	(3) Average sales price of domestic dyes (weighted average of all types). Calendar years.					(4) Invoice value imported dyes 1914 (weighted average of all types).[1]
		1917	1918	1919	1920	1921	
8	Direct yellow R	$2.55	$2.61	$1.74	$1.49	$1.07	$0.178
11	Chloramine orange G	3.28	2.86	1.99	1.88	1.60	.239
23	Tartrazine	1.50	1.91	2.04	1.86	1.80	.200
34	Chrysoidine R	1.22	1.22	1.12	.79	.78	.165
37	Croceine orange	1.13	.89	.88	1.04	.86	.133
58	Alizarin yellow R	.83	.91	.84	.86	.69	.154
84	Lana fuchsine	2.45	2.05	2.02	1.30	.....	.143
73	Helio fast red	4.00	5.57	3.75	3.82	.....	.230
82	Ponceau 2R	1.45	.91	.80	.80	.73	.095
134	Metanil yellow	2.24	1.61	1.65	1.64	1.20	.164
137	Acid yellow G	1.32	.85	.....	.....	1.04	.176
145	Orange II	.98	.68	.63	.62	.51	.081
157	Diamond black PV	.....	.....	.....	1.65	1.25	.130
161	Fast red A	1.19	1.03	1.05	1.04	.96	.118
163	Azo rubine	2.71	1.51	1.43	1.43	1.26	.204
168	Amaranth	1.31	.88	2.98	2.11	3.23	.129
169	Cochineal red	1.44	1.16	1.32	1.26	.99	.127
177	Mordant yellow	.74	1.36	1.35	1.65	.98	.147
181	Salicine black U	1.62	1.25	1.25	1.10	.75	.156
188	Sulphon acid blue R	2.24	2.24	2.03	1.95	1.67	.252
217	Agalma black 10B	1.08	1.26	1.47	1.29	1.09	.134
257	Sulphocyanine	2.20	2.24	2.21	2.26	1.74	.166
265	Sulphocyanine black	2.25	2.11	1.91	1.80	1.48	.110
266	Naphthylamine black	1.89	.84	.90	.87	.94	.144
275	Diamond black	2.50	1.40	1.48	1.54	1.25	.172
283	Bismarck brown	1.17	.81	1.01	.84	.78	.186
303	Paper yellow	6.18	3.41	1.27	1.19	1.22	.176
304	Chrysophenine G	12.64	5.71	2.53	2.81	2.03	.270
307	Congo red	2.47	2.01	1.12	.86	.80	.179
312	Congo corinth G	2.50	2.25	1.94	1.83	1.52	.178
327	Diamine violet N	2.50	.....	3.32	2.97	2.17	.255
339	Oxamine black BHN	2.50	3.25	2.72	2.49	1.48	.133
343	Diamine fast red F	.....	.....	2.72	2.59	2.09	.362
344	Diamine brown	.....	2.60	2.20	1.99	1.65	.194
361	Benzo purpurine 4B	1.61	1.62	1.76	1.39	1.20	.133
405	Benzo purpurine 10B	.....	4.73	2.07	2.47	2.33	.234
420	Benzamurine G	.....	3.00	3.18	1.98	1.53	.261
426	Benzamine pure blue	5.00	4.49	1.97	2.43	1.39	.440
430	Columbia black	.....	1.90	2.00	1.92	1.33	.134
462	Direct deep black E. W	.75	.85	1.04	1.03	.79	.144
469	Erie direct black RX	.....	.....	1.01	.....	.71	.139

[1] Norton, Thomas H.: "Artificial Dyestuffs used in the United States," Department of Commerce, Special Agents' Series No. 121.

TABLE 12.—*Domestic prices of dyes, 1917 to 1921, compared with invoice values 1914*—Continued.

(1) Schultz No.	(2) Name of dye (weighted average of all dyes).	(3) Average sales price of domestic dyes (weighted average of all types). Calendar years. 1917	1918	1919	1920	1921	(4) Invoice value imported dyes 1914 (weighted average of all types).[1]
474	Oxamine green B	$2.30	$2.20	$1.85	$1.51	$1.21	$0.174
476	Benzamine brown 3GO	1.80	1.70	1.65	1.60	1.15	.....
477	Congo brown G	2.00	2.25	1.85	1.58	1.45	.194
493	Auramine	4.00	3.76	3.08	2.48	2.02	.240
495	Malachite green	6.28	5.60	3.26	3.32	1.97	.241
499	Brilliant green	.....	5.63	4.66	4.23	3.68	.221
512	Magenta	9.10	7.72	4.59	4.67	3.28	.294
515	Methyl violet	3.84	2.78	2.44	2.39	1.66	.248
530	Acid violet	8.50	7.00	4.93	5.20	3.64	.281
536	Alkali blue	4.71	8.33	6.35	5.90	3.42	.490
566	Wool green S	6.50	.....	5.95	4.99	1.88	.353
573	Rhodamine B	10.00	15.92	6.90	6.72	4.86	.415
587	Eosine	8.58	7.81	6.30	4.19	2.51	.418
592	Erythrosine B	11.31	9.73	8.51	.....	7.72	.210
616	Primuline	4.43	3.04	1.17	1.59	1.37	.144
617	Columbia yellow	3.00	3.56	2.66	2.36	1.59	.133
626	Gallocyanine	5.96	5.12	3.03	3.06	2.44	.347
659	Methylene blue	3.09	2.80	3.02	2.94	1.94	.391
679	Safranine	5.93	5.85	4.02	3.88	2.60	.359
698	Nigrosine (spirit soluble)	1.11	.71	.71	.88	.70	.126
699	Induline (soluble in water)	1.51	.70	.67	1.03	.96	.252
700	Nigrosine (soluble in water)	.80	.63	.59	.72	.68	.149
720	Sulphur black	.60	.37	.28	.25	.23	.100
763	Indanthrene dark blue BO	.....	.....	.....	2.12	2.31	.....
842	Indanthrene blue GCD paste	.....	.....	6.96	2.40	2.41	.354
849	Indanthrene yellow	.....	.....	1.75	4.68	3.76	.334
858	Alizarin saphirol B	.....	20.00	10.70	8.58	6.22	.....
874	Indigo, synthetic	1.42	.88	.59	.74	.45	.128

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES DURING 1921.

SUMMARY.

The total importation of coal-tar dyes during the calendar year 1921 was 3,803,943 pounds valued at $4,654,451, compared with 3,402,582 pounds valued at $5,763,437 during the calendar year 1920, and 3,501,147 pounds during the fiscal year 1920. In comparing the poundage of 1921 with that of 1920, allowance should be made for an increase of 303,005 pounds in the 1921 figures, due to the conversion for the first time of the most of the vat dyes to a single strength basis, in order to give the total poundage of any individual vat dye on a definite known basis of strength. The total quantity of dyes as imported in 1921 was 3,500,938 pounds.

The imports of 1921 represent 9.7 per cent of the production during that year, and 8.3 per cent of the total imports during 1914, when the United States imported 45,950,895 pounds and produced 6,619,729 pounds from German-made intermediates. The dyes imported include those products which are either not yet manufactured in this country or are not yet produced in an adequate quantity or in a satisfactory quality to meet all special requirements.

[1] Norton, Thomas H.: "Artificial Dyestuffs used in the United States," Department of Commerce, *Special Agents' Series* No. 121.

Table 14 shows the quantity and value of each individual dye imported during the calendar year 1921 and also the percentage of each by the country of origin. Germany supplied 47.5 per cent of the total dyes imported during 1921, a decrease of 3.5 per cent from that of 1920; 40.3 per cent came from Switzerland, an increase of 6.3 per cent over the previous year; 8.2 per cent originated in England, an increase of 2.2 per cent, compared with 1920; while Italy supplied 3 per cent of the dyes imported, these imports largely representing reexported reparation dyes of German manufacture. Holland supplied 0.5 per cent, probably nearly all of German origin; France, 0.3 per cent. The imports of dyes from all other countries totaled 0.3 per cent.

TABLE 13.—*Summary of dyes imported for consumption in the United States during the calendar years 1921 and 1920, classified by application.*

Class.	1921		1920	
	Total pounds.	Per cent.	Total pounds.	Per cent.
Acid	1,319,222	34.72	733,405	21.55
Vat:				
(a) Indigo	70,975	1.87	171,101	5.04
(b) Vat (other than indigo)	978,737	25.64	761,363	22.37
Total	1,049,712	27.51	932,464	27.41
Mordant and chrome:				
(a) Alizarin	136,283	3.59	73,252	2.16
(b) Mordant and chrome	496,002	13.05	636,230	18.71
Total	632,285	16.64	709,482	20.87
Direct	388,715	10.23	571,581	16.80
Sulphur	200,653	5.28	229,140	6.73
Basic	154,673	4.07	192,163	5.64
Spirit soluble and color lakes	38,090	1.00	17,527	.51
Unidentified, unclassified, special	20,594	.55	16,820	.49
Total	3,803,943	100.00	3,402,582	100.00

Symbols denoting manufacturer.—In the table of imports of dyes under the heading "manufacturer" is shown a symbol for each dye, which refers to the following list of manufacturers in foreign countries.

1. THE SIX LEADING GERMAN COMPANIES.

A.....Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.

B.....Badische Anilin- und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.

By.....Farbenfabriken vorm. Firedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.

C.....Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.

K.....Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branch in Russia.

M.....Farbwerke vorm. Meister Lucius & Brüning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2. THE SEVEN SMALLER GERMAN COMPANIES.

BK.....Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.
CG.....Chemikalienwerk Griesheim G. m. b. H., Griesheim on the Main. Founded 1881.
CJ.....Carl Jäger G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.
GrE.....Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.
L.....Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.
tM.....Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.
WD.....Wülfing, Dahl & Co., A. G. Barmen. Founded 1842.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES.

FA.....Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF.....Niederlandische Farben- und Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897. Branch in Russia.
LG.....Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
P.....Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL.

DH.....Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
G.....Anilinfarben- und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany, and Russia.
I.....Gesellschaft fur chemische Industrie. Founded 1885. Branch in France.
S.....Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES.

ClCo.....The Clayton Aniline Co. (Ltd.), Clayton, near Manchester. Founded 1876.
CR.....Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.
CV.....Colne Vale Chemical Co., Milnsbridge, near Huddersfield.
RHS.....Read Holliday & Sons (Ltd.), Huddersfield. Founded 1830. (Purchased by British Dyes (Ltd.).)
BD.....British Dyes (Ltd.). Founded 1915.
Lev.....Levinstein (Ltd.), Crumpsall Vale, near Manchester. Founded 1864.
Q.....Importations of unknown source, through dealers in colors.

TABLE 14.—*Imports of dyes during the calendar year 1921.*

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
	Total		*Pounds.* 3,803,943	$4,654,451	Germany, 47.5 per cent; Switzerland, 40.3 per cent; England, 8.2 per cent; Italy, 3 per cent; Holland, 0.5 per cent; France, 0.3 per cent; all other countries, 0.3 per cent.
4	Naphthol green		190		Germany, 100 per cent.
	Naphthol green B	C			
7	Naphthol yellow		50		England, 100 per cent.
	Naphthol yellow S	Q			
9	Direct yellow		544		Germany, 100 per cent.
	Naphthamine yellow BN	K			
	Naphthamine yellow G	K			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
16	Curcuphenine	ClCo	1,000		England, 100 per cent.
18	Diphenyl fast yellow		2,204		Switzerland, 100 per cent.
	Diphenyl chlorine yellow FF, supra 287.	G			
19	Fast light yellow		19,234	$29,406	Switzerland, 56 per cent; Germany, 44 cent.
	Erio flavine SX 654	G			
	Fast light yellow G 10526	By			
	Fast light yellow G P1-10526	By			
	Fast light yellow G VIII 10526	By			
	Fast light yellow G conc. 80/100 10526a.	By			
	Fast light yellow 3G 1110	By			
	Fast light yellow 3G conc	By			
	Fast light yellow 3G conc. 75/100 10528B.	By			
	Fast light yellow RG	By			
	Fast light yellow GGN 10531 P111.	By			
20	Flavazine S		6,096		Germany, 100 per cent.
	Flavazine S	M			
22	Xylene light yellow		60,422	99,737	Switzerland, 100 per cent.
	Xylene light yellow GG	S			
	Xylene light yellow 2G	S			
	Xylene light yellow 2G conc	S			
	Xylene light yellow R	S			
23	Tartrazine		38,395	46,541	Switzerland, 90 per cent; Germany, 9.9 per cent; England, 0.1 per cent.
	Tartrazine XX	B			
	Tartrazine conc	S			
	Tartrazine conc., pure	S			
	Tartrazine N	RHS			
	Tartrazine brown B	S			
25	Dianil yellow 3G	M	100		Germany, 100 per cent.
28	Hansa yellow G		2,725		Do.
	Hansa yellow G	M			
	Hansa yellow G, lumps	M			
29	Eriochrome red		1,102		Switzerland, 100 per cent.
	Eriochrome red B 915	G			
37	Croceine orange		198		Germany, 100 per cent.
	Croceine orange X	C			
38	Orange G		320		Do.
	Orange GG crystals	C			
42	Amido naphthol red G		12,036		Switzerland, 100 per cent.
	Erio floxine 2G conc. 575	G			
	Erio floxine 6B conc. 576	G			
45	Brilliant lake red R		10,000		Germany, 100 per cent.
	Brilliant lake red R, paste	M			
56	Antol red		2,094		Do.
	Pigment red B, paste	M			
60	Azo phosphine GO		423		Do.
	Azo phosphine GOK	M			
61	Victoria violet		2,052	1,234	Switzerland, 73 per cent; Germany, 27 per cent.
	Victoria violet 4BS	S			
	Victoria violet 4BS	M			
	Victoria violet 4BSL	M			
63	Azo acid blue		4,425		Switzerland, 100 per cent.
	Azo acid blue B	S			
64	Lanafuchsine		402		Germany, 100 per cent.
	Lanafuchsine BBS	C			
	Lanafuchsine SG	C			
66	Amido naphthol red 6B		200		Do.
	Amido naphthol red BB	M			
72	Helio fast red		1,111		Do.
	Helio fast red RL powder	By			
81	Brilliant cochineal		412		Do.
	Brilliant cochineal 4R	C			
83	Ponceau 3R		192		Do.
	Ponceau X	K			
85	Omega chrome black		1,001		Switzerland, 100 per cent.
	Omega chrome black P conc	S			
86	Azarine S	M	511		Germany, 100 per cent.
87	Peri wool blue		300		Do.
	Peri wool blue B	C			
88	Acid anthracene brown		9,028	5,138	Do.
	Acid anthracene brown R	By			
	Acid anthracene brown R 11051	By			
	Acid anthracene brown R 11051 (IX).	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
88	Acid anthracine brown—Cont'd.				
	Acid anthracene brown RH extra.	By			
	Acid anthracene brown RH extra 11055.	By			
	Acid anthracene brown RH extra 11055 P1.	By			
	Acid anthracene brown WSG 27423.	By			
	Acid anthracene brown RR extra (11055).	By			
92	Metachrome Bordeaux R		342		Germany, 100 per cent.
	Metachrome Bordeaux B	A			
93	Sudan R		1,285		Do.
	Pigment purple A paste	M			
113	Crystal ponceau		159		Do.
	Crystal ponceau 6R	K			
118	Geranine		3,882	$1,012	Do.
	Geranine G	By			
	Geranine G 295	By			
	Brilliant geranine G	By			
119	Diamine rose		741		Do.
	Diamine rose FFB	C			
	Diamine rose FFB extra	C			
121	Erica B		2,339	6,555	Germany, 69 per cent; Switzerland, 31 per cent.
	Erica B extra	A			
	Erica BN	A			
	Erica B conc	S			
126	Indoine blue R		50		Germany, 100 per cent.
	Indoine blue BB	B			
132	Lake red P		6,000		Do.
	Lake red P paste	M			
133	Eriochrome phosphine R		2,292		Switzerland, 100 per cent.
	Eriochrome phosphine RR 958	G			
134	Metanil yellow		3,637	3,154	Do.
	Metanil yellow	Q			
	Matanil yellow	I			
139	Orange IV		220		Do.
	Orange IV powder 522	G			
140	Curcumeine		3,681		Do.
	Jasmeine high conc. 729	G			
141	Azo yellow		14,990	12,519	Do.
	Helianthine DFF 731	G			
	Helianthine G 751	G			
	Azo yellow I	I			
152	Permanent Red 4B		4,134	6,914	Germany, 100 per cent.
	Lithol Rubine BN powder	B			
	Permanent red extra powder	A			
	Permanent red R extra powder	A			
	Permanent red 4B extra powder	A			
154	Palatine Chrome Brown		900		Do.
	Palatine chrome brown RX	B			
158	Chrome brown RR		794		Switzerland, 100 per cent.
	Chrome brown RVV 899	G			
159	Acid Alizarin black		2,806		Switzerland, 65 per cent; Germany, 35 per cent.
	Acid Alizarin black R	I			
	Acid Alizarin black R	M			
161	Fast red		602		Germany, 100 per cent.
	Fast red S	M			
164	Diamond blue R		1,455		Do.
	Diamond blue R Pl 10043	By			
168	Amaranth		520		Do.
	Amaranth	C			
	Naphthol red EB	C			
177	Mordant yellow		51		Do.
	Milling yellow O	M			
180	Eriochrome blue black BC		38,220		Switzerland, 100 per cent.
	Eriochrome blue black BC 926	G			
	Eriochrome blue black G 925	G			
181	Salicine black U		3,303	290	Germany, 100 per cent.
	Salicine black U	K			
	Salicine black D	K			
	Salicine black UL	K			
	Anthracene blue black BE	C			
182	Brilliant sulphon red		7,235	10,163	Switzerland, 100 per cent.
	Brilliant sulphon red B	S			
	Brilliant sulphon red 10B	S			
	Fast sulphon violet 5BS	S			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
183	Eriochrome black T conc		124,947		Switzerland 100 per cent.
	Eriochrome black T 934	G			
184	Eriochrome black A		216,947		Do.
	Eriochrome black A 922	G			
185	Anthracene chrome black		2,196	$522	Germany, 100 per cent.
	Anthracene chrome black 5B	C			
	Anthracene chrome black FE	C			
	Anthracene chrome black PF	C			
	Anthracene chrome black PPN extra.	C			
196	Thiazol yellow		6,945	9,540	Switzerland, 100 per cent.
	Thiazol yellow G conc	S			
	Mimosa Z conc 331	G			
207	Diphenyl fast brown GNC		969		Do.
	Diphenyl fast brown GNC 129	G			
	Diphenyl fast brown GF 365	G			
211	Resorcin brown		300		Germany, 100 per cent.
	Resorcin brown F	K			
212	Acid brown		1,542		Switzerland, 100 per cent.
	Acid brown RN 532	G			
217	Agalma black 10B		1,870	263	Germany, 100 per cent.
	Agalma black 10BX	B			
	Naphthol blue black	C			
	Naphthol blue black S	C			
	Naphthol blue black pure	C			
218	Nigrophor		1,000		Do.
	Nigrophor	B			
220	Palatine black		9,850	6,620	Do.
	Wool black 6B	A			
	Wool black GRF	A			
	Wool jet black 3B (old type)	A			
221	Anthracene acid brown		889		Do.
	Anthracene acid brown G	C			
222	Janus yellow		1,770		Do.
	Janus yellow G	M			
223	Sudan III		525		Do.
	Cerasine red B	C			
227	Brilliant croceine		2,339	2,191	Germany, 51 per cent; Italy, 49 per cent.
	Brilliant croceine 3B	C			
	Brilliant croceine 3BA	By			
	Brilliant croceine M	C			
	Brilliant croceine M 85/100	C			
	Cotton scarlet extra	B			
240	Janus red B		200		Germany, 100 per cent.
	Janus red B	M			
241	Neutral gray G		188		Do.
	Diamine gray G	C			
247	Scarlet		518		Do.
	Scarlet MS	C			
257	Sulphocyanine		51,889	77,204	England, 81 per cent; Germany, 19 per cent.
	Sulphocyanine GR extra	By			
	Coomassie navy blue 2RN	BD			
260	Eriochrome verdon		2,667		Switzerland, 100 per cent.
	Eriochrome verdon S	G			
	Eriochrome verdon S 1042	G			
265	Sulphocyanine black		615		Germany, 100 per cent.
	Tolyl black BGII	M			
266	Naphthylamine black		587	76	Do.
	Naphthylamine black 4B	C			
	Naphthylamine black 4BS	C			
	Naphthylamine black ESN	C			
	Naphthylamine black S	C			
	Naphthylamine black 4BX	B			
269	Acid black		1,705		Germany, 100 per cent
	Blue black solide O	M			
270	Brilliant croceine 9B		362		Do.
	Brilliant croceine 9B	C			
272	Brilliant black		306		Do.
	Naphthol black P	C			
273	Diaminogen blue		15,934	15,191	Do.
	Diaminogen blue BB	C			
	Diaminogen blue NA	C			
	Diaminogen blue NB	C			
274	Diaminogen		7,813	9,995	Germany, 94 per cent Italy, 6 per cent.
	Diaminogen B	C			
	Diaminogen extra	C			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
	Diaminogen—Continued.		*Pounds.*		
	Diazo indigo blue BR extra	By			
	Diazo indigo blue 2RL	By			
	Diazo indigo blue 2RL 1221	By			
	Diazo indigo blue 2RL 10417	By			
	Diazo indigo blue 2RL 10417 (VII).	By			
	Diazo indigo blue 2RL conc. 70/100 10417a.	By			
	Diazo indigo blue 2RL conc. 70/100 10417a (VII).	By			
	Diazo indigo blue 3RL	By			
	Diazo indigo blue 3RL conc. 50/100 10418a (VII).	By			
	Zambesi pure blue 4B	A			
275	Diamond black		2,375	$796	Germany, 74 per cent; Switzerland, 26 per cent.
	Fast mordant black FH	M			
	Diamond black FB	By			
276	Diamond green		1,677		Germany, 100 per cent.
	Diamond green SS	K			
	Diamond green SS 10980 (P1)	By			
277	Anthracene acid black		1,576		Do.
	Anthracene acid black DSF	C			
	Anthracene acid black DSF extra.	C			
	Anthracene acid black DSFB	C			
	Anthracene acid black ST	C			
279	Benzo fast scarlet		10,373	12,056	Germany, 79 per cent; Switzerland, 21 per cent.
	Benzo fast scarlet 4BA 10024 Pl.	By			
	Benzo fast scarlet 4BS 1024	By			
	Benzo fast scarlet 4BS 10020(VI)	By			
	Benzo fast scarlet 4BS 10020 (Pl)	By			
	Benzo fast scarlet 4BS conc.	By			
	Benzo fast scarlet 4BS conc. 75/100 10020a.	By			
	Benzo fast scarlet 4BS conc. 75/100 10020a (VI).	By			
	Benzo fast scarlet 5BS 1161	By			
	Benzo fast scarlet 5BS 10021	By			
	Benzo fast scarlet 7BS	By			
	Benzo fast scarlet 8BS 10023	By			
	Benzo fast scarlet 8BS 10023 (Pl)	By			
	Benzo fast scarlet GS	By			
	Benzo fast scarlet GS 10019 (Pl).	By			
	Direct fast scarlet SE conc.	I			
283	Bismark brown		1,338		Germany, 100 per cent.
	Bismark brown GG	C			
293	Milling red		551		Switzerland, 100 per cent.
	Acid milling red G conc. 631	G			
294	Fast mordant yellow		531		Germany, 100 per cent.
	Anthracene yellow C powder	C			
	Fast mordant yellow G powder	B			
296	Cotton yellow		2,403	4,321	Do.
	Cotton yellow GI	B			
	Benzo fast yellow 4GL extra	By			
	Benzo fast yellow 4GL extra 1565	By			
	Benzo fast yellow 4GL extra 10102.	By			
	Benzo fast yellow RL	By			
	Benzo fast yellow RL 28168	By			
	Diamine fast yellow 3G	C			
	Cotton yellow GX	B			
297	Benzo fast pink 2BL		22		Do.
	Benzo fast pink 2BL	By			
304	Chrysophenine		1,300		Switzerland, 100 per cent.
	Chrysophenine conc.	S			
306	Pyramine orange 3G		437		Germany, 100 per cent.
	Pyramine orange 3G	B			
315	Congo orange		258		Do.
	Congo orange G	By			
316	Brilliant congo G	A	77		Do.
319	Diamine scarlet		10,899	12,642	Germany, 63 per cent; Switzerland, 35 per cent; Holland, 2 per cent.
	Diamine scarlet B	C			
	Diamine scarlet B 130 per cent.	C			
	Diamine scarlet 3B	C			
	Diamine scarlet 3B	Q			
	Diamine scarlet 3B 120 per cent.	C			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
319	Diamine scarlet—Continued.				
	Diamine scarlet HS	C.			
	Diamine scarlet HS	Q.			
	Chloramine red 3B	S.			
	Diamine brilliant Bordeaux R	C.			
322	Trisulphon violet B		5,504		Switzerland, 100 per cent.
	Trisulphon violet B	S.			
326	Oxy diamine violet		1,710	$193	Germany, 100 per cent.
	Oxamine violet	B.			
	Naphthamine violet BE	K.			
	Benzo violet R 10196	By.			
	Benzo violet	By.			
	Benzo violet O	By.			
329	Diamine brown V		282		Do.
	Diamine brown V	C.			
330	Zambesi brown		403		Do.
	Zambesi brown 4R	A.			
332	Benzo fast red		6,046	9,507	Germany, 95 per cent; Holland, 5 per cent.
	Benzo fast red 8BL	By.			
	Benzo fast red 8BL 10018	By.			
	Benzo fast red 8BL 10018(V1)	By.			
	Benzo fast red 9BL	By.			
	Benzo fast red 9BL 10043(P1)	By.			
	Benzo fast red L	Q.			
334	Diphenyl blue black double		551		Switzerland, 100 per cent.
	Diphenyl blue black double	G.			
335	Naphthamine black		772		Germany, 100 per cent.
	Naphthamine black CE	K.			
	Naphthamine black CET (U4)	K.			
338	Naphthamine blue		376		Do.
	Naphthamine blue 3R	K.			
	Naphthamine blue 7R	K.			
340	Benzo orange R	S.	500		Switzerland, 100 per cent.
342	Chrysamine		7,815		Do.
	Chrysamine K	S.			
343	Diamine fast red		6,049	9,070	Switzerland, 67 per cent; Germany, 33 cent.
	Diamine fast red 8BL	C.			
	Diamine fast red 8BL 140 per cent.	C.			
	Diphenyl fast red B supra 340	G.			
	Chloramine fast red F	S.			
	Benzo fast red FC	By.			
	Dianil fast red PH	M.			
344	Diamine brown		584		Germany, 100 per cent.
	Diamine brown ATC	C.			
346	Oxamine red		2,668		Do.
	Oxamine red	B.			
	Oxamine red X	B.			
349	Diamine brown B		208	174	Do.
	Diamine brown B	C.			
	Diamine brown B	K.			
352	Direct violet R	I.	2		Switzerland, 100 per cent.
354	Direct gray R		5,026		Do.
	Direct gray R paste 1022	G.			
355	Anthracene acid red		336		Do.
	Anthracene acid red 3B	Q.			
358	Diphenyl red		4,036	5,784	Switzerland, 74 per cent; Germany, 7 per cent; Italy, 19 per cent.
	Diphenyl red SC 373	G.			
	Tolulene red	GrE.			
360	Pyramine orange R	B.	856		Germany, 100 per cent.
363	Benzopurpurine 4B		621	832	Do.
	Benzopurpurine 4B	K.			
	Cotton fast red 4BSP	B.			
364	Diazo brilliant black		751	564	Germany, 47 per cent; Italy, 53 per cent.
	Diazo brilliant black B	By.			
	Diazo brilliant black B 487	By.			
366	Delta purpurine		727		Germany, 100 per cent.
	Delta purpurine 5B extra indien	By.			
368	Brilliant purpurine 4B		1,243		Do.
	Brilliant purpurine 10B	A.			
370	Brilliant congo		1,273	1,450	Switzerland, 52 per cent; Germany, 48 per cent.
	Brilliant congo R	A.			
	Brilliant congo R 10012(P1)	By.			
	Brilliant congo R	S.			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
373	Congo orange		500		Germany, 100 per cent.
	Congo orange R	A			
388	Chicago blue R	A	101		Do.
392	Toluylene orange		523	$1,092	Do.
	Toluylene fast orange GL	By			
	Toluylene fast orange GL 10082	By			
	Toluylene fast orange GL 10082E	By			
400	Acid anthracene red		6,120	2,025	Do.
	Acid anthracene red 3B	By			
	Acid anthracene red G	By			
	Acid anthracene red 2BL 1949	By			
404	Diamine yellow N		1,327		Do.
	Diamine yellow N 110 per cent	C			
413	Direct violet BB		2		Switzerland, 100 per cent.
	Direct violet 2B	I			
418	Diamine brilliant blue G		100		Germany, 100 per cent.
	Diamine brilliant blue G	K			
424	Chicago blue 6B		7,471	24,400	Switzerland, 59 per cent; Germany, 41 per cent.
	Brilliant benzo blue 6B 10134(P1)	By			
	Chloramine sky blue FF	S			
	Direct sky blue green shade	I			
	Direct sky blue green shade conc	I			
426	Benzamine pure blue		1,001		Switzerland, 100 per cent.
	Chloramine sky blue A conc	S			
431	Diamine gold	C	146		Germany, 100 per cent.
432	Diamine cutch		1,225	334	Do.
	Diamine cutch	C			
	Diamine cutch 2475	C			
	Diamine cutch 20495	C			
436	Columbia black		5,512		Do.
	Columbia black FF extra	A			
448	Diamine bronze R		661		Do.
	Diamine bronze G	C			
449	Trisulphon brown		38,558		Switzerland, 100 per cent.
	Trisulphon brown B	S			
	Trisulphon brown MB	S			
451	Congo fast blue		8,818		Germany, 100 per cent.
	Congo fast blue R extra	A			
456	Benzo fast blue		3,768	7,125	Germany, 98.4 per cent; Italy, 1.6 per cent.
	Congo fast blue B	A			
	Benzo fast blue 2GL	By			
	Benzo fast blue, 4GL	By			
	Benzo fast blue 4GL 1854	By			
	Benzo fast blue 4GL 10185	By			
	Benzo fast blue 4GL 10185(P1)	By			
	Benzo fast blue 4GL 10185(VI)	By			
457	Trisulphon brown GG		22,872	30,477	Switzerland, 100 per cent.
	Trisulphon brown GG	S			
	Trisulphon brown GG conc	S			
	Trisulphon brown GG conc	G			
458	Naphthamine direct black		1,579	113	Germany, 100 per cent.
	Naphthamine direct black EK	K			
	Naphthamine direct black EK extra A	K			
	Naphthamine direct black GNM	K			
	Naphthamine direct black RWK	K			
	Naphthamine direct black RWK extra A	K			
462	Direct deep black		11,102		Switzerland, 100 per cent.
	Carbide black E conc	I			
467	Diphenyl green G		2,204		Do.
	Diphenyl green KGW supra 288	G			
469	Chloramine black		2,602		Do.
	Chloramine black extra conc	S			
	Chloramine black extra conc. pure	S			
471	Chloramine blue 3G	S	1,102		Do.
473	Diamine black HW		370		
	Diamine black HW	C			Germany, 100 per cent.
475	Oxamine green C		806	1,081	Switzerland, 100 per cent.
	Direct green G	S			
	Chloramine G	S			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
345	Patent blue A—Continued.		*Pounds.*		
	Brilliant acid blue FF 10573D (VIII).	By			
	Brilliant acid blue FF conc 60/100 10573B.	By			
	Brilliant acid blue FF conc 60/100 10573B (VIII).	By			
	Brilliant acid blue A conc 55/100 10573C.	By			
	Brilliant acid blue A conc	Q			
	Brilliant acid blue FF (10573I)	By			
	Brilliant acid blue A	By			
346	Cyanol		14,170	$30,263	Germany, 99 per cent; Holland, 1 per cent.
	Cyanol extra	C			
	Cyanol FF	C			
	Cyanol FF extra	C			
	Cyanol extra H	C			
	Cyanol BSB	Q			
	Cyanol ABC	Q			
	Cyanol BSB	C			
	Cyanol MKH	C			
	Cyanol MKH	Q			
348	Acid violet 6BN		4,790	11,421	Switzerland, 98 per cent; Germany, 2 per cent.
	Acid violet 6BN	M			
	Acid violet 6BN	I			
	Acid violet 6BN conc	I			
351	Eriochrome azurol BC		19,344	36,792	Switzerland, 100 per cent.
	Eriochrome azurol BX	G			
	Eriochrome azurol BX 1041	G			
	Chrome fast pure blue B	I			
354	Chrome azurol		2,050		Do.
	Chrome azurol SXT 1046	G			
355	Aurine		300		Germany, 100 per cent.
	Aurine S. I. S.	A			
358	Victoria blue R		771		Switzerland, 100 per cent.
	Victoria blue R	I			
359	Victoria blue B		12,342	33,062	Switzerland, 99 per cent; Germany, 1 per cent.
	Victoria blue B	B			
	Victoria blue B base	B			
	Victoria blue B base	I			
	Victoria blue B conc	I			
	Victoria blue B conc	S			
	Victoria blue B highly conc	B			
	Victoria pure blue B base	B			
	Victoria pure blue BO	B			
360	Night blue		317		Germany, 100 per cent.
	Night blue	B			
	Night blue extra green shade	By			
362	Fast acid blue		597	921	Do.
	Fast acid blue B 483	By			
	Wool blue SR extra 10564	By			
363	New patent blue B		421		Do.
	New patent blue B 10570 (Pl.)	By			
364	Naphthalene green		12,665	33,483	Switzerland, 93 per cent; Germany, 7 per cent.
	Naphthalene green conc. extra	M			
	Naphthalene green V	M			
	Erio green supra 657	G			
	Erio green B supra 657	G			
	Erio green BB supra 661	G			
	Kiton fast green V	I			
	Kiton fast green V conc	I			
365	Acid blue B		1,231	2,326	Germany, 100 per cent.
	Wool blue G extra	A			
	Wool blue 5B	A			
366	Wool green S		51,822	115,279	Switzerland, 70 per cent; Germany, 30 cent.
	Wool green S	B			
	Wool green S conc	S			
	Wool green S highly conc	B			
	Wool green BS 10550 (Pl)	By			
	Cyanole green KBC	C			
	Cyanole fast green G	C			
	Wool green S conc. 250 per cent.	I			
	Wool green SC 655	G			
	Wool green SC 655 95 per cent	G			
369	Acridine red	Q	4		France, 100 per cent.

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
527	Acid violet 4BN		13,544	$24,479	Switzerland, 96 per cent; Germany, 4 per cent.
	Acid violet 4BNS	S.			
	Acid violet 4BNS	I.			
	Acid violet BW	By.			
	Acid violet BW1175	By.			
528	Fast acid violet 10B		14,837	30,747	Switzerland, 71 per cent; Germany, 29 cent.
	Fast acid violet 10B	By.			
	Fast acid violet 10B 10604	By.			
	Fast acid violet 10B 10604 (VIII)	By.			
	Fast acid violet 10B conc. 40/100.	By.			
	Fast acid violet 10B conc. 40/100 10604B.	By.			
	Keton fast violet 10B conc	I.			
530	Acid violet		2,580	5,829	Germany, 79 per cent; Switzerland, 21 per cent.
	Acid violet 6B 668	G			
	Acid violet 6BNOO	B			
	Acid violet 7B	K			
531	Eriocyanine		15,342	25,558	Switzerland, 100 per cent.
	Eriocyanine A665	G			
	Eriocyanine AC503	G			
532	Alkali violet		50		Germany, 100 per cent.
	Alkali violet 6BOO	B			
534	Acid violet 7B		1,287	500	Do.
	Acid violet 7B	B			
	Acid violet 7B conc	B			
	Acid violet 7B conc. F	B			
535	Methyl alkali blue		10		Do.
	Methyl alkali blue	M			
536	Alkali blue		390	522	Do.
	Alkali blue B	C			
	Alkali blue 3B	C			
	Alkali blue 3RV	C			
537	Methyl blue for silk		6,755	22,388	Switzerland, 90 per cent; Germany, 10 per cent.
	Methyl Lyons blue 410	G			
	Methyl silk blue (new) 706	G			
	Methyl silk blue (new) 217	G			
	Silk blue 1V	By.			
539	Soluble blue		3,435	11,999	Germany, 100 per cent.
	Water blue 32129	A			
	Soluble blue N	B			
	Silk blue BT5B00	GrE			
	Silk blue BT5B00	Q			
	Silk blue	Q			
541	Brilliant Dianil blue 6G		273		Do.
	Brilliant sky blue 5G 1374	By.			
543	Patent blue		41,512	89,238	Germany, 80 per cent; Switzerland, 20 per cent.
	Neptune blue BGX	B			
	Neptune blue BGX conc	B			
	Patent blue X conc	M			
	Patent blue B	M			
	Patent blue B conc	M			
	Patent blue J4	M			
	Patent blue N conc	M			
	Patent blue V	M			
	Patent marine blue LE	M			
	Patent marine blue LE	A			
	Tetra cyanole extra	C			
	Tetra cyanole V	C			
	Brilliant acid blue V	By.			
	Brilliant acid blue V conc. 60/100 10754a.	By.			
	Kiton pure blue V	I.			
	Kiton pure blue V conc	I.			
544	Cyanine B		3,651		Germany, 100 per cent.
	Cyanine B	M			
545	Patent blue A		16,170	29,483	Germany, 99 per cent Holland, 1 per cent.
	Patent blue A	K			
	Patent blue A	M			
	Neptune blue BXX	B			
	Brilliant acid blue	By.			
	Brilliant acid blue A1448	By.			
	Brilliant acid blue FF	By.			
	Brilliant acid blue FF C573	By.			
	Brilliant acid blue FF 1507	By.			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

...litz ...o.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
606	Phosphine—Continued.		*Pounds.*		
	Phosphine R	BD			
	Patent phosphine M 300 per cent.	I			
	Patent phosphine G 300 per cent	I			
	Patent phosphine GG 300 per cent.	I			
	Patent phosphine R 300 per cent	I			
	Brilliant phosphine 5G 300 per cent.	I			
	Brilliant phosphine 5G conc	I			
	Phosphine G triple	I			
	Phosphine 7G 807 leather	G			
	Phosphine 7GG 808 leather	G			
	Patent phosphine G conc. 300 per cent balance.	I			
	Patent phosphine GG conc. 300 per cent.	I			
	Patent phosphine 5G	I			
607	Rheonine		130	$492	Germany, 100 per cent
	Rheonine GD	B			
	Rheonine AL conc	B			
608	Euchrysine		965	811	Do.
	Euchrysine RRX	B			
	Euchrysine GRNTN	B			
	Euchrysine RRDX	B			
	Euchrysine RT	B			
	Euchrysine 3RX	B			
	Euchrysine 2RX	B			
609	Homophosphine		918	2,287	Germany, 67 per cent; England, 33 per cent.
	Diamond Phosphine GG	C			
	Homophosphine OO	L			
	Corioflavine GOOO	GrE			
613	Quinoline Yellow		21,898	40,803	Switzerland, 65 per cent; Germany, 35 per cent.
	Quinoline Yellow	I			
	Quinoline Yellow	S			
	Quinoline Yellow	A			
	Quinoline Yellow	M			
	Quinoline Yellow 10334(P1)	By			
	Quinoline Yellow conc. 50/100	By			
	Quinoline Yellow extra	B			
	Quinoline Yellow RT extra	By			
	Quinoline Yellow KT extra conc.	By			
	Quinoline Yellow N extra 10536 (P1).	By			
	Quinoline yellow OK	M			
	Quinoline O conc	M			
	Quinoline yellow	By			
	Quinoline yellow O	M			
	Quinoline yellow extra (easily soluble).	B			
	Quinoline yellow 754	G			
	Quinoline yellow	S			Switzerland, 100 per cent.
616	Primuline		771		
	Polychromine AC 127	G			
617	Columbia yellow		4,799	7,216	England, 58 per cent; Switzerland, 41.7 per cent; Germany, 0.3 per cent.
	Chloramine yellow G	S			
	Diamine fast yellow FF	C			
	Oxyphenine R	ClCo			
	Oxyphenine GG 300 per cent conc.	ClCo			
618	Thioflavine T		6,997	11,750	Germany, 73 per cent; Italy, 23 per cent; Switzerland, 4 per cent.
	Thioflavine T	S			
	Thioflavine T	K			
	Thioflavine T	C			
	Thioflavine TCN	C			
	Rhoduline yellow 6G	By			
	Rhoduline yellow 6G 1280	By			
620	Capri blue GON		549		Germany, 100 per cent
	Capri blue GON conc	L			
	Capri blue GON	L			
622	Delphine blue B		10,617		Switzerland, 100 per cent.
	Brilliant Delphine blue B	S			
	Brilliant Delphine blue BS	S			
626	Gallocyanine		12,343	4,967	Switzerland, 97 per cent; Germany, 3 per cent.
	Gallocyanine paste	S			
	Gallocyanine F powder	B			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of tity).
			Quantity.	Invoice value.	
			Pounds.		
627	Anthracyanine		154		Switzerland, 100
	Anthracyanine S powder	DH			cent.
629	Modern blue	DH	10		Do.
635	Modern violet		2,002		Do.
	Ultra violet MO	S			
636	Prune		1,928		Do.
	Prune pure	S			
637	Gallamine blue extra paste		15,179		Do.
	Gallamine blue extra paste 900	G			
	Gallamine blue extra paste	G			
641	Celestine blue B		5		Do.
	Coreine RR powder No. 65	Q			
649	Cotton blue		2,882		Do.
	Meldola's blue 3R conc	S			
651	New methylene blue GG	C	266		Germany, 100 per
653	Nile blue		749		Do.
	Nile blue BX	B			
654	Nile blue 2B		764		Do.
	Nile blue BBX	B			
658	Fast black		408		Do.
	Gallophenine P	By			
	Gallophenine P 100 per cent	By			
659	Methylene blue		1,479	$2,520	Switzerland, 83
	Methylene blue	Q			cent; Germany
	Methylene blue medic. fine powder.	I			per cent.
	Methylene blue BG extra conc	tM			
	Methylene blue BBS zinc free	S			
660	Methylene green		3,318	6,490	Switzerland, 99.7
	Methylene green BX	B			cent; Germany,
	Methylene green W 748	G			per cent.
	Methylene green P extra	I			
661	Thionine blue		421		Switzerland, 52
	Thionine blue GO	I			cent; Germany
	Thionine blue GO	M			per cent.
663	New methylene blue		1,315	3,213	Germany, 69 per
	New methylene blue N	C			England, 23 per
	New methylene blue N extra conc.	M			Italy, 8 per cent
	New methylene blue N conc. 145 per cent.	C			
667	Indochromine		8,725	23,172	Switzerland, 98
	Indochromine RR	S			cent; Germany,
	Indochromine RR conc. double	S			cent.
	Indochromine T	S			
	Indochromine T conc	S			
	Brilliant alizarine blue R powder 571.	By			
672	Azo carmine		8,684	19,428	Germany, 100 per
	Azo carmine GX	B			
	Azo carmine GX 30 853	B			
	Azo carmine GX powder	B			
673	Azocarmine B		1,774	1,848	Germany, 89 per
	Azo acid carmine B	M			England, 11 per
	Azocarmine BB	B			
	Azocarmine BX	B			
	Azocarmine BXH	B			
	Rosinduline 2B bluish	K			
676	Neutral blue R extra		110		Switzerland, 100
	Neutral blue R	I			cent.
679	Safranine		741		Germany, 60 per
	Safranine FF extra conc	By			Switzerland, 40
	Safranine FF extra conc	Q			cent.
681	New fast gray		899		France, 100 per ce
	Direct gray J	P			
687	Rosolane OTR		2,393	15,437	Germany, 100 per
	Rosolane O	M			
	Methylene heliotrope extra conc.	M			
688	Rosolane		131	392	France, 92 per
	Rosolane	P			Germany, 8 per
	Rosolane extra strong	M			
689	Indazine M	C	258		Germany, 100 per
690	Metaphenylene blue R		1,700		Do.
	Diphene blue RK	A			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schedule No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
606	Phosphine—Continued.		*Pounds.*		
	Phosphine R	BD			
	Patent phosphine M 300 per cent.	I			
	Patent phosphine G 300 per cent	I			
	Patent phosphine GG 300 per cent.	I			
	Patent phosphine R 300 per cent	I			
	Brilliant phosphine 5G 300 per cent.	I			
	Brilliant phosphine 5G conc	I			
	Phosphine G triple	I			
	Phosphine 7G 807 leather	G			
	Phosphine 7GG 808 leather	G			
	Patent phosphine G conc. 300 per cent balance.	I			
	Patent phosphine GG conc. 300 per cent.	I			
	Patent phosphine 5G	I			
607	Rheonine		130	$492	Germany, 100 per cent
	Rheonine GD	B			
	Rheonine AL conc	B			
608	Euchrysine		965	811	Do.
	Euchrysine RRX	B			
	Euchrysine GRNTN	B			
	Euchrysine RRDX	B			
	Euchrysine RT	B			
	Euchrysine 3RX	B			
	Euchrysine 2RX	B			
609	Homophosphine		918	2,287	Germany, 67 per cent; England, 33 per cent.
	Diamond Phosphine GG	C			
	Homophosphine OO	L			
	Corioflavine GOOO	GrE			
613	Quinoline Yellow		21,898	40,893	Switzerland, 65 per cent; Germany, 35 per cent.
	Quinoline Yellow	I			
	Quinoline Yellow	S			
	Quinoline Yellow	A			
	Quinoline Yellow	M			
	Quinoline Yellow 10534(P1)	By			
	Quinoline Yellow conc. 50/100	By			
	Quinoline Yellow extra	B			
	Quinoline Yellow RT extra	By			
	Quinoline Yellow KT extra conc.	By			
	Quinoline Yellow N extra 10536 (P1).	By			
	Quinoline yellow OK	M			
	Quinoline O conc	M			
	Quinoline yellow	By			
	Quinoline yellow O	M			
	Quinoline yellow extra (easily soluble).	B			
	Quinoline yellow 754	G			
	Quinoline yellow	S			Switzerland, 100 per cent.
616	Primuline		771		
	Polychromine AC 127	G			
617	Columbia yellow		4,799	7,216	England, 58 per cent; Switzerland, 41.7 per cent; Germany, 0.3 per cent.
	Chloramine yellow G	S			
	Diamine fast yellow FF	C			
	Oxyphenine R	ClCo			
	Oxyphenine GG 300 per cent conc.	ClCo			
618	Thioflavine T		6,997	11,750	Germany, 73 per cent; Italy, 23 per cent; Switzerland, 4 per cent.
	Thioflavine T	S			
	Thioflavine T	K			
	Thioflavine T	C			
	Thioflavine TCN	C			
	Rhoduline yellow 6G	By			
	Rhoduline yellow 6G 1280	By			
620	Capri blue GON		549		Germany, 100 per cent
	Capri blue GON conc	L			
	Capri blue GON	L			
622	Delphine blue B		10,617		Switzerland, 100 per cent.
	Brilliant Delphine blue B	S			
	Brilliant Delphine blue BS	S			
626	Gallocyanine		12,343	4,967	Switzerland, 97 per cent; Germany, 3 per cent.
	Gallocyanine paste	S			
	Gallocyanine F powder	B			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage ity).
			Quantity.	Invoice value.	
761	Indanthrene golden orange R—Con.		*Pounds.*		
	Indanthrene golden orange RRT paste, fine.	B			
	Indanthrene golden orange RRT paste, sand free.	B			
	Indanthrene golden orange RRT powder.	B			
762	Indanthrene scarlet GS powder		472		Germany, 100
	Indanthrene scarlet G paste	B			
	Indanthrene scarlet GS powder.	B			
763	Indanthrene dark blue BO paste		3,484	$1,822	Germany, 57
	Indanthrene dark blue BO paste.	B			England, 43
	Indanthrene dark blue BO paste, sand free.	B			
	Indanthrene dark blue BO	B			
765	Indanthrene green B paste		6,932	3,978	Germany, 100
	Indanthrene green B paste	B			
	Indanthrene green B double paste.	B			
	Indanthrene green B double paste, sand free.	B			
766	Indanthrene violet R extra paste		5,241	1,720	Italy, 85 pe
	Indanthrene violet R extra paste.	B			Germany, cent.
	Indanthrene violet R extra powder.	B			
767	Indanthrene violet RR		45,154	58,134	Germany, 88 p
	Indanthrene violet 2R extra paste.	B			Italy, 10 pe
	Indanthrene violet 2R extra paste, fine.	B			England, 2 p
	Indanthrene violet RR extra	B			
	Indanthrene violet RR extra paste.	B			
	Indanthrene violet RR extra paste, fine.	B			
	Indanthrene violet RR extra paste, sand free.	B			
	Indanthrene violet RR extra p paste.	B			
	Indanthrene violet RR extra powder.	B			
	Indanthrene violet RR extra p powder.	B			
	Indanthrene violet RRX powder.	B			
768	Indanthrene violet B		14,957	3,045	Germany, 89 p
	Indanthrene violet B extra paste.	B			Holland, 11 p
	Indanthrene black BB paste redissolved.	B			
	Indanthrene black BB double paste.	Q			
	Indanthrene black BB double paste.	B			
	Indanthrene black BB double paste, sand free.	B			
	Indanthrene black BB powder	B			
774	Alizarin black		25,524	9,284	Germany, 100 p
	Alizarin black B	K			
	Alizarin black B powder	By			
	Alizarin black S paste for printing.	M			
	Alizarin black S paste	B			
	Alizarin black SRW paste	B			
	Alizarin black WR 16/100 paste.	B			
	Alizarin black WR 40/100 paste.	B			
	Alizarin black WX extra paste	B			
	Alizarin black WX extra N paste	B			
	Alizarin black WX extra single paste.	B			
	Alizarin blue black GT powder	B			
778	Alizarin synthetic		136,283	49,707	
779	Alizarin orange		5,854	1,500	Holland, 36 pe
	Alizarin orange	B			Germany, 34 p
	Alizarin orange SW powder	B			England, 30 p
	Alizarin orange GG	M			
	Alizarin orange 80 powder	M			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
779	Alizarin orange—Continued.		*Pounds.*		
	Alizarin orange W 15	M			
	Alizarin orange 20/100	Q			
	Alizarin orange SW powder 884 (R).	By			
780	Alizarin red		15,565	$16,653	Germany, 96 per cent; England, 4 per cent.
	Alizarin red S powder	B			
	Alizarin red SWB powder	B			
	Alizarin red SWBB powder	B			
	Alizarin red WB paste	B			
	Alizarin red WX extra S paste	B			
	Alizarin red W powder	K			
	Alizarin red W powder	By			
	Alizarin red W powder 773	By			
	Alizarin red W powder 11376	By			
	Alizarin red W powder 11376(PI)	By			
	Alizarin red W powder 10/400	By			
	Alizarin red IWs powder	M			
	Alizarin red IWs conc	M			
782	Alizarin brown		20,700	1,272	Germany, 100 per cent.
	Alizarin brown 1687	M			
	Alizarin brown 40	M			
	Alizarin brown 80 per cent	M			
	Alizarin brown F	M			
	Alizarin brown H	M			
	Alizarin brown N	M			
	Anthracene brown 20/100 paste	B			
	Anthracene brown 40/100 paste	B			
	Anthracene brown 100 per cent powder.	B			
	Anthracene brown SW powder	B			
	Anthracene brown SWR powder	B			
	Anthracene brown W 20/100	M			
	Anthracene brown WR	M			
	Anthracene brown WR 20/100 paste.	B			
	Anthracene brown WB 20/100 paste.	B			
	Anthracene brown WG 20/100 paste.	B			
784	Alizarin SX, GD		12,205	2,386	Do.
	Alizarin Sx	B			
	Alizarin SX 20/100	B			
	Alizarin Sx 20/100 paste	B			
	Alizarin SX powder	B			
	Alizarin GD II	B			
	Alizarin GD 20 per cent paste	B			
785	Alizarin RG GI		18,266	4,673	Germany, 77 per cent; England, 23 per cent.
	Alizarin RG powder	B			
	Alizarin GI powder	G			
	Alizarin YCA 20/100	Q			
	Alizarin GG	By			
	Alizarin red SDG 20/100	M			
	Alizarin red SDG paste	M			
787	Alizarin Bordeaux B, BD		1,803	1,436	England, 66 per cent; Germany, 34 per cent.
	Alizarin Bordeaux B paste	B			
	Alizarin Bordeaux paste	By			
	Alizarin Bordeaux 20/100	Q			
788	Alizarin cyanine R		2,750	1,380	England, 73 per cent; Germany, 27 per cent.
	Alizarin cyanine R powder	By			
	Alizarin cyanine WRB paste 11308 (PI).	By			
	Alizarin cyanine 10/100	By			
789	Anthracene blue WR		107,769	93,857	Germany, 100 per cent.
	Anthracene blue WR paste	B			
	Anthracene blue WR double paste.	B			
	Anthracene blue WR double paste.	B			
	Anthracene blue WR extra paste.	B			
790	Acid alizarin blue BB, GR		14,375	5,891	Germany, 91 per cent; France, 9 per cent.
	Acid alizarin blue GR	M			
	Anthracene blue SWGG powder	B			
	Anthracene blue SWGG extra powder.	B			
	Anthracene blue SWR powder	B			
	Anthracene dark blue W paste	B			
	Acid alizarine blue BB	M			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of tity).
			Quantity.	Invoice value.	
			Pounds.		
791	Indanthrene olive G powder B		5		Germany 100 per
792	Cibanone orange R		5,887	$14,188	Switzerland, 100
	Cibanone orange R paste pat	I			cent.
	Cibanone orange R powder pat	I			
	Cibanone green B paste pat	I			
	Cibanone green G paste pat	I			
	Cibanone olive B paste pat	I			
793	Cibanone blue 3G		227		Do.
	Cibanone blue 3G paste 10/100 pat.	I			
	Cibanone blue 3G paste pat	I			
794	Cibanone black		1,102		Do.
	Cibanone black B paste pat	I			
795	Cibanone yellow R		1,770	7,537	Do.
	Cibanone yellow R paste pat	I			
	Cibanone yellow R powder pat	I			
796	Acid alizarin green B. G		1,322	250	Germany, 100 per
	Acid alizarin green B	M			
	Acid alizarin green 3G	M			
797	Alizarin garnet		1,523		Do.
	Alizarin claret R paste	M			
798	Alizarin maroon W		2,751		Do.
	Alizarin maroon 20/100 paste	B			
799	Alizarin cyanine G		3,336	3,224	Germany, 55 per
	Alizarin cyanine G extra powder 11319(Pl).	By			England, 38 per France, 7 per ce
	Alizarin cyanine GG powder	By			
	Alizarin cyanine RR powder 11307(Pl).	By			
	Alizarin cyanine GG powder 100 per cent.	By			
800	Anthracene blue		4,057	139	Germany, 100 per
	Anthracene blue WB paste	B			
	Anthracene blue WG paste	B			
801	Anthracene blue WGG		4,409		Do.
	Anthracene blue WGG paste	B			
803	Alizarin blue WX, A		12,482	9,845	Do.
	Alizarin blue	M			
	Alizarin blue A 20	M			
	Alizarin blue A 100 per cent	M			
	Alizarin blue WX 20 per cent	B			
	Alizarin blue WX 20 per cent paste.	B			
	Alizarin blue JR	K			
	Alizarin blue JR powder 1130	By			
804	Alizarin blue S		21,321	11,801	Germany, 90 per
	Alizarin blue S	M			Italy, 8 per
	Alizarin blue S 45/100	M			Switzerland,
	Alizarin blue S powder	B			cent.
	Alizarin blue S powder 11388(Pl)	By			
	Alizarin blue SAP powder	By			
	Alizarin blue SAWSA	By			
	Alizarin blue SB 45	M			
	Alizarin blue SB 45 conc	M			
	Alizarin blue SW powder	By			
	Alizarin dark blue S 23	M			
	Alizarin blue SR	M			
	Alizarin blue SRW paste	B			
	Alizarin blue SRW powder	B			
	Alizarin blue SW	M			
	Alizarin blue SW powder	B			
	Alizarin blue S powder	By			
	Alizarin blue SAP	S			
805	Alizarin green		2,000		England, 100 per
	Alizarin green S paste 15/100	Q			
808	Alizarin green S paste		4,465	4,645	Germany, 100 per
	Alizarin green S paste	B			
	Alizarin green CG	K			
	Alizarin green CG extra	K			
809	Alizarin indigo blue S		619		Do.
	Alizarin indigo blue S paste	B			
810	Helindone yellow 3GN (single strength).		352		Italy, 100 per cent
	Helindone yellow 3GN powder	M			
811	Algol yellow 3G		1,048		Germany, 100 per
	Algol yellow 3G paste 1487	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Units No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
812	Indanthrene orange RT paste	B	212		Germany, 100 per cent.
816	Algol red 5G (single strength)		578		Do.
	Algol red 5G paste	By			
	Algol red 5G powder 1539	By			
817	Algol yellow R (single strength)		2,400		Do.
	Algol yellow R powder	By			
818	Algol pink R (single strength)		5,153	$3,372	Germany, 87 per cent; Italy, 13 per cent.
	Algol pink R paste	By			
	Algol pink R paste, 10 per cent 11569 (111).	By			
	Algol pink R paste, 1:8 11569(P1)	By			
	Algol pink R powder	By			
	Algol pink R powder 1665	By			
	Algol pink R powder (11570)	By			
819	Algol red R FF (single strength)		14,489	15,899	Germany, 88 per cent; Holland, 2 per cent; England, 10 per cent.
	Algol brilliant red 2B paste 8/100 11747(111).	By			
	Algol brilliant red 2B paste	By			
	Algol brilliant red 2B powder	By			
	Algol brilliant red 2B powder 11573.	By			
	Algol red F extra powder 1870	By			
	Algol red F extra powder 11563	By			
	Algol red FF extra paste	By			
	Algol red FF extra paste 1857	By			
	Algol red FF extra paste, 8 per cent 11562(111).	By			
	Algol red FF extra powder 11563	By			
	Algol red R extra paste	By			
	Algol red R extra paste, 1:8 11560(P1).	By			
	Algol red R extra paste 8/100 11560(111).	By			
820	Algol brilliant violet R		3,782	4,463	Germany, 100 per cent.
	Algol brilliant violet R paste 1773.	By			
	Algol brilliant violet R paste 1804.	By			
	Algol brilliant violet R paste 10/100 11749(111).	By			
	Algol brilliant violet R powder	By			
	Algol brilliant violet R powder 11749a(111).	By			
	Algol brilliant violet R paste	By			
821	Algol brilliant violet 2B (single strength).		1,951	1,560	Germany, 74 per cent; Italy, 26 per cent.
	Algol brilliant violet 2B	By			
	Algol brilliant violet 2B paste 10/100 11748 (111).				
	Algol brilliant violet 2B powder	By			
	Algol brilliant violet 2B powder 11654.	By			
	Algol blue 3R powder	By			
	Algol blue 3RP powder	By			
	Algol brilliant violet 2B paste	By			
822	Algol brilliant orange FR (single strength).		1,228	2,840	Italy, 18 per cent; Germany, 82 per cent.
	Algol brilliant orange FR paste	By			
	Algol brilliant orange FR powder 1822.	By			
	Algol brilliant orange FR powder 11576.	By			
	Algol brilliant orange FR powder 11576(111).	By			
824	Algol orange R (single strength)		2,685	301	Germany, 100 per cent.
	Algol orange R paste	K			
	Algol orange R paste 1:8 11574 (P1).	By			
	Algol orange R powder 1501	By			
	Algol orange R powder 1155	By			
	Algol orange R powder 11575(P1)	By			
825	Algol Red B		6,626	7,706	Germany, 98 per cent; Holland, 2 per cent.
	Algol red B paste	Q			
	Algol red B paste	By			
	Algol Red B paste 11556(P1)	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
791	Indanthrene olive G powder B		5		Germany 100 per cent.
792	Cibanone orange R		5,887	$14,188	Switzerland, 100 per cent.
	Cibanone orange R paste pat	I			
	Cibanone orange R powder pat	I			
	Cibanone green B paste pat	I			
	Cibanone green G paste pat	I			
	Cibanone olive B paste pat	I			
793	Cibanone blue 3G		227		Do.
	Cibanone blue 3G paste 10/100 pat.	I			
	Cibanone blue 3G paste pat	I			
794	Cibanone black		1,102		Do.
	Cibanone black B paste pat	I			
795	Cibanone yellow R		1,770	7,537	Do.
	Cibanone yellow R paste pat	I			
	Cibanone yellow R powder pat	I			
796	Acid alizarin green B. G		1,322	250	Germany, 100 per cent.
	Acid alizarin green B	M			
	Acid alizarin green 3G	M			
797	Alizarin garnet		1,523		Do.
	Alizarin claret R paste	M			
798	Alizarin maroon W		2,751		Do.
	Alizarin maroon 20/100 paste	B			
799	Alizarin cyanine G		3,336	3,224	Germany, 55 per cent; England, 38 per cent; France, 7 per cent.
	Alizarin cyanine G extra powder 11319(Pl).	By			
	Alizarin cyanine GG powder	By			
	Alizarin cyanine RR powder 11307(Pl).	By			
	Alizarin cyanine GG powder 100 per cent.	By			
800	Anthracene blue		4,057	139	Germany, 100 per cent.
	Anthracene blue WB paste	B			
	Anthracene blue WG paste	B			
801	Anthracene blue WGG		4,409		Do.
	Anthracene blue WGG paste	B			
803	Alizarin blue WX, A		12,482	9,845	Do.
	Alizarin blue	M			
	Alizarin blue A 20	M			
	Alizarin blue A 100 per cent	M			
	Alizarin blue WX 20 per cent	B			
	Alizarin blue WX 20 per cent paste.	B			
	Alizarin blue JR	K			
	Alizarin blue JR powder 1130	By			
804	Alizarin blue S		21,521	11,801	Germany, 90 per cent; Italy, 6 per cent; Switzerland, 4 per cent.
	Alizarin blue S	M			
	Alizarin blue S 45/100	M			
	Alizarin blue S powder	B			
	Alizarin blue S powder 11388(Pl)	By			
	Alizarin blue SAP powder	By			
	Alizarin blue SAWSA	By			
	Alizarin blue SB 45	M			
	Alizarin blue SB 45 conc	M			
	Alizarin blue SW powder	By			
	Alizarin dark blue S 23	M			
	Alizarin blue SR	M			
	Alizarin blue SRW paste	B			
	Alizarin blue SRW powder	B			
	Alizarin blue SW	M			
	Alizarin blue SW powder	B			
	Alizarin blue S powder	By			
	Alizarin blue SAP	S			
805	Alizarin green		2,000		England, 100 per cent.
	Alizarin green S paste 15/100	Q			
808	Alizarin green S paste		4,465	4,645	Germany, 100 per cent.
	Alizarin green S paste	B			
	Alizarin green CG	K			
	Alizarin green CG extra	K			
809	Alizarin indigo blue S		619		Do.
	Alizarin indigo blue S paste	B			
810	Helindone yellow 3GN (single strength).		352		Italy, 100 per cent.
	Helindone yellow 3GN powder	M			
811	Algol yellow 3G		1,048		Germany, 100 per cent.
	Algol yellow 3G paste 1487	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
812	Indanthrene orange RT paste	B	212		Germany, 100 per cent.
816	Algol red 5G (single strength)		578		Do.
	Algol red 5G paste	By			
	Algol red 5G powder 1539	By			
817	Algol yellow R (single strength)		2,400		Do.
	Algol yellow R powder	By			
818	Algol pink R (single strength)		5,153	$3,372	Germany, 87 per cent; Italy, 13 per cent.
	Algol pink R paste	By			
	Algol pink R paste, 10 per cent 11569 (111).	By			
	Algol pink R paste, 1:8 11569(P1)	By			
	Algol pink R powder	By			
	Algol pink R powder 1665	By			
	Algol pink R powder (11570)	By			
819	Algol red R FF (single strength)		14,489	15,899	Germany, 88 per cent; Holland, 2 per cent; England, 10 per cent.
	Algol brilliant red 2B paste 8/100 11747(111).	By			
	Algol brilliant red 2B paste	By			
	Algol brilliant red 2B powder	By			
	Algol brilliant red 2B powder 11573.	By			
	Algol red F extra powder 1870	By			
	Algol red F extra powder 11563	By			
	Algol red FF extra paste	By			
	Algol red FF extra paste 1857	By			
	Algol red FF extra paste, 8 per cent 11562(111).	By			
	Algol red FF extra powder 11563	By			
	Algol red R extra paste	By			
	Algol red R extra paste, 1:8 11560(P1).	By			
	Algol red R extra paste 8/100 11559(111).	By			
820	Algol brilliant violet R		3,782	4,463	Germany, 100 per cent.
	Algol brilliant violet R paste 1773.	By			
	Algol brilliant violet R paste 1894.	By			
	Algol brilliant violet R paste 10/100 11749(111).	By			
	Algol brilliant violet R powder	By			
	Algol brilliant violet R powder 11749a(111).	By			
	Algol brilliant violet R paste	By			
821	Algol brilliant violet 2B (single strength).		1,951	1,560	Germany, 74 per cent; Italy, 26 per cent.
	Algol brilliant violet 2B	By			
	Algol brilliant violet 2B paste 10/100 11748 (111).				
	Algol brilliant violet 2B powder	By			
	Algol brilliant violet 2B powder 11654.	By			
	Algol blue 3R powder	By			
	Algol blue 3RP powder	By			
	Algol brilliant violet 2B paste	By			
822	Algol brilliant orange FR (single strength).		1,228	2,840	Italy, 18 per cent; Germany, 82 per cent.
	Algol brilliant orange FR paste	By			
	Algol brilliant orange FR powder 1822.	By			
	Algol brilliant orange FR powder 11576.	By			
	Algol brilliant orange FR powder 11576(111).	By			
824	Algol orange R (single strength)		2,685	301	Germany, 100 per cent.
	Algol orange R paste	K			
	Algol orange R paste 1:8 11574 (P1).	By			
	Algol orange R powder 1501	By			
	Algol orange R powder 1155	By			
	Algol orange R powder 11575(P1)	By			
825	Algol Red B		6,626	7,706	Germany, 98 per cent; Holland, 2 per cent.
	Algol red B paste	Q			
	Algol red B paste	By			
	Algol Red B paste 11556(P1)	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
827	Indanthrene claret B extra (single strength).	.....	9,020	$8,532	Germany, 84 per cent; Belgium, 12 per cent; England, 4 per cent.
	Indanthrene claret B extra paste	B			
	Indanthrene claret B extra paste sand free.	B			
	Indanthrene claret B double paste.	B			
	Indanthrene claret B extra powder.	B			
	Indanthrene Bordeaux B extra paste.	B			
	Indanthrene Bordeaux B extra double paste.	B			
	Indanthrene Bordeaux B double paste sand free.	B			
830	Indanthrene red R (single strength).	.....	3,760	2,480	Germany, 100 per cent.
	Indanthrene red R paste	B			
	Indanthrene red R powder	B			
831	Indanthrene red BN (single strength).	.....	20,405	26,808	Germany, 97 per cent; England, 3 per cent.
	Indanthrene red BN extra paste.	A			
	Indanthrene red BN extra paste.	B			
	Indanthrene red BN extra paste fine.	B			
	Indanthrene red, BN extra paste sand free.	B			
	Indanthrene red, BN extra powder.	B			
	Indanthrene red BN paste	B			
832	Indanthrene violet RN	.....	1,680	.....	Germany, 100 per cent.
	Indanthrene violet RN extra sand free.	B			
833	Algol olive R (single strength)	.....	337	357	Germany, 74 per cent; Italy, 26 per cent.
	Algol olive R paste	By			
	Algol olive R powder	By			
834	Algol gray (single strength)	.....	120	.....	Germany, 100 per cent.
	Algol gray B powder	By			
836	Helindone brown 3GN	.....	350	.....	Do.
	Helindone Brown 3GN paste	M			
838	Indanthrene blue RS (single strength).	.....	12,958	2,936	Germany, 82 per cent; Italy, 18 per cent.
	Indanthrene blue RS paste	B			
	Indanthrene blue RS paste (for paper).	B			
	Indanthrene blue RS paste (for paper) sand free.	B			
	Indanthrene blue RSP paste	B			
	Indanthrene blue RS double paste.	B			
	Indanthrene blue RS double paste sand free.	B			
	Indanthrene blue RS (for paper) powder triple.	B			
	Indanthrene blue RSP triple powder.	B			
839	Algol blue K (single strength)	.....	66	.....	Italy, 100 per cent.
	Algol blue K powder	By			
840	Indanthrene blue 3G (single strength).	.....	15,215	12,702	Germany, 58 per cent; Italy, 42 per cent.
	Indanthrene blue 3G paste	B			
	Indanthrene blue 3G paste sand free.	B			
	Indanthrene blue 3G double paste sand free.	B			
	Indanthrene blue 3G powder	B			
841	Indanthrene blue GGS (single strength).	.....	2,260	2,172	Germany, 100 per cent.
	Indanthrene blue GGSP paste	B			
	Indanthrene blue GGSP double paste (thin).	B			
	Indanthrene blue GGSP double paste (thick).	B			
	Indanthrene blue GGSZ double paste.	B			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Valuation No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
842	Indanthrene blue GCD (single strength).	.....	201,835	$75,061	Germany, 90 per cent; Italy, 10 per cent.
	Indanthrene blue GCD single paste.	B.....	.....	.....	
	Indanthrene blue GCD paste sand free.	B.....	.....	.....	
	Indanthrene blue GDC double paste.	B.....	.....	.....	
	Indanthrene blue GCD double paste.	Q.....	.....	.....	
	Indanthrene blue GCD double paste fine.	B.....	.....	.....	
	Indanthrene blue GCD double paste sand free.	B.....	.....	.....	
	Indanthrene blue GCD powder.	B.....	.....	.....	
	Indanthrene blue GCD double paste.	B.....	.....	.....	
	Indanthrene blue GCD paste...	B.....	.....	.....	
	Duranthrene blue CC.....	BD.....	.....	.....	
843	Indanthrene blue GC paste.....	B.....	240	.....	Germany, 100 per cent.
844	Algol blue 3G (single strength).....	.....	4,623	3,435	Germany, 90 per cent; Italy, 10 per cent.
	Algol blue 3G paste.....	By.....	.....	.....	
	Algol blue 3G paste 1412.....	By.....	.....	.....	
	Algol blue 3G paste 11588...	By.....	.....	.....	
	Algol blue 3G paste 1:8 11588 (III)	By.....	.....	.....	
	Algol blue 3G paste 9/100 11588..	By.....	.....	.....	
	Algol blue 3G powder 1495.....	By.....	.....	.....	
	Algol blue 3G powder 11589.....	By.....	.....	.....	
847	Algol green B (single strength).....	.....	1,080	.....	Germany, 79 per cent; Italy, 21 per cent.
	Algol green B powder.....	By.....	.....	.....	
848	Indanthrene gray BP (single strength).	.....	2,204	229	Germany, 76 per cent; Italy, 24 per cent.
	Indanthrene gray B paste.....	B.....	.....	.....	
	Indanthrene gray B paste sand free.	B.....	.....	.....	
	Indanthrene gray double paste sand free.	B.....	.....	.....	
849	Indanthrene yellow (single strength).	.....	26,139	23,105	Germany, 85 per cent; England, 4 per cent; Italy, 11 per cent.
	Indanthrene yellow G paste....	B.....	.....	.....	
	Indanthrene yellow G double paste fine.....	B.....	.....	.....	
	Indanthrene yellow G powder..	B.....	.....	.....	
	Indanthrene yellow GP powder.	B.....	.....	.....	
	Indanthrene yellow GN extra paste sand free.	B.....	.....	.....	
	Indanthrene yellow R paste....	B.....	.....	.....	
	Indanthrene yellow R paste sand free.	B.....	.....	.....	
	Indanthrene yellow R powder..	B.....	.....	.....	
	Indanthrene yellow GT double paste.	B.....	.....	.....	
	Indanthrene yellow G double paste.	B.....	.....	.....	
	Indanthrene yellow R paste 100 per cent.	B.....	.....	.....	
	Duranthrene yellow GX.....	BD.....	.....	.....	
850	Indanthrene blue WB.....	.....	116	.....	Germany, 100 per cent.
	Indanthrene blue WBO powder.	B.....	.....	.....	
	Indanthrene blue WB powder..	B.....	.....	.....	
851	Alizarin direct blue B.....	.....	225	1,361	Do.
	Alizarin direct blue E 3 B.....	M.....	.....	.....	
	Alizarin cyanole B.....	C.....	.....	.....	
852	Alizarin irisol D R.....	.....	2,456	5,657	Do.
	Alizarin irisol R powder.....	By.....	.....	.....	
	Alizarin irisol R conc. 75/100 powder 11362B.	By.....	.....	.....	
	Alizarin direct violet.....	M.....	.....	.....	
853	Anthraquinone violet powder.....	B.....	1,165	.....	Do.
854	Alizarin viridine DG, FF.....	.....	9,499	7,675	Do.
	Alizarin viridine FF paste.....	By.....	.....	.....	
	Alizarin viridine FF paste 11299(P1).	By.....	.....	.....	
	Alizarin viridine FF paste 1:4 11299A.	By.....	.....	.....	

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of ity).
			Quantity.	Invoice value.	
854	Alizarin viridine DG, FF—Contd.		*Pounds.*		
	Alizarin viridine FF paste 11712.	By			
	Alizarin viridine FF powder 11300(P1).	By			
	Alizarin viridine FF powder	By			
855	Alizarin pure blue		12,547	$35,298	Germany, 100 p
	Alizarin sky blue	K			
	Alizarin sky blue	By			
	Alizarin sky blue powder	By			
	Alizarin sky blue B conc	By			
	Alizarin sky blue B powder	By			
	Alizarin sky blue B powder 1038.	By			
	Alizarin sky blue B powder 11351.	By			
	Alizarin sky blue B powder 11351 (P1).	By			
	Alizarin sky blue B powder 11351 (V).	By			
	Alizarin sky blue B powder 113551.	By			
	Alizarin sky blue B conc. 70/100 powder (11351a).	By			
	Alizarin sky blue 1038	By			
856	Alizarin Astrol		22,562	46,069	Germany, 9 cent; Holland cent; England cent; Italy, cent; Belgium cent.
	Alizarin Astrol B powder	B			
	Alizarin Astrol B powder	By			
	Alizarin Astrol B powder 11350.	By			
	Alizarin Astrol B powder 40/100.	By			
	Alizarin Astrol B powder 1225	By			
	Alizarin Astrol B powder 11350 (P1).	By			
	Alizarin Astrol B powder conc. 40/100 11350.	By			
	Alizarin Astrol B powder conc. 40/100 113503(V).	By			
	Alizarin Astrol B extra	By			
	Alizarin Rubinol 3G	By			
	Alizarin Rubinol 3G powder	By			
	Alizarin Rubinol 3G powder 11372.	By			
	Alizarin Rubinol 3G powder 11372 (P1).	By			
	Alizarin Rubinol 3G conc. powder 40/100 (11372A).	By			
	Alizarin Rubinol GW powder	B			
	Alizarin Rubinol GW powder	By			
	Alizarin Rubinol GW powder 1582.	By			
	Alizarin Rubinol GW powder 11371.	By			
	Alizarin Rubinol GW powder 11371 (P1).	By			
	Alizarin Rubinol GW powder 11371 (V).	By			
	Alizarin Rubinol R	K			
	Alizarin Rubinol R	By			
	Alizarin Rubinol R powder	By			
	Alizarin Rubinol R powder 1395.	By			
	Alizarin Rubinol R powder 11370 (P1).	By			
	Alizarin Rubinol R powder conc. 40/100 11375 A.	By			
858	Alizarin saphirol B		26,828	69,063	Germany, 76 p Italy, 13 p Holland, 8 p Switzerland, cent.
	Alizarin saphirol	Q			
	Alizarin saphirol B	By			
	Alizarin saphirol B conc. 60/100.	By			
	Alizarin saphirol B powder	B			
	Alizarin saphirol B powder	By			
	Alizarin saphirol BL powder 11357 (P1).	By			
	Alizarin saphirol C2S65 powder 11336 (P1).	By			
	Alizarin saphirol SE conc. 75/100	By			
	Alizarin saphirol SE powder	B			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
858	Alizarin saphirol B—Continued.		*Pounds.*		
	Allizarin saphirol SE powder 847.	By			
	Alizarin saphirol SE powder 11341.	By			
	Alizarin saphirol SE powder 11341 (Pl).	By			
	Alizarin saphirol SE powder 11341 (V).	By			
	Alizarin saphirol WAS powder 1780.	By			
	Alizarin saphirol WAS powder 11345 (Pl).	By			
	Helio Fast Blue BL	By			
	Helio Fast Blue BL conc	By			
	Helio Fast Blue BL 50/100 conc 10867B.	By			
859	Cyananthrol R		1,414	$6,164	Germany, 100 per cent.
	Cyananthrol RBX powder	B			
	Cyananthrol RX powder	B			
	Cyananthrol RXO	B			
	Cyananthrol RXO powder	B			
860	Cyananthrol G		12,713	139,946	Germany, 91 per cent; Belgium, 9 per cent.
	Cyananthrol	B			
	Cyananthrol BGA	B			
	Cyananthrol BGA powder	B			
	Cyananthrol BGAO	B			
	Cyananthrol BGAOO	B			
	Cyananthrol BGAOO 90/100	B			
	Cyananthrol BGAOO powder	B			
	Cyananthrol BGAOO powder	M			
861	Anthraquinone Blue SR		853		Germany, 100 per cent.
	Anthraquinone Blue SR extra powder.	B			
862	Alizarin blue black		42,611	29,763	Germany, 98 per cent; Italy, 1 per cent; Holland ,1 per cent.
	Alizarin blue black 3B	By			
	Alizarin blue black 3B powder	By			
	Alizarin blue black 3B powder 11366(Pl).	By			
	Alizarin blue black B	M			
	Alizarin blue black B	C			
	Alizarin blue black B conc	By			
	Alizarin blue black B conc. 11365(Pl).	By			
	Alizarin blue black B conc. 80/100.	By			
	Alizarin blue black B paste	M			
	Alizarin blue black B powder	B			
	Alizarin blue black B powder	By			
	Alizarin blue black B powder 725	By			
	Alizarin blue black B powder 10364.	By			
	Alizarin blue black B powder 11364.	By			
	Alizarin blue black B powder 11364(Pl).	By			
	Alizarin blue black B powder 11644.	By			
	Alizarin blue black B powder conc 70/100 11365a.	By			
	Alizarin blue black BT powder.	B			
	Alizarin blue black B powder conc. 80/100 11365B.	By			
863	Anthraquinone blue green		3,040	1,274	Germany, 96 per cent; France, 4 per cent.
	Anthraquinone blue green	B			
	Anthraquinone blue green BX powder D.	B			
	Anthraquinone blue green BXO	Q			
	Anthraquinone blue green BXO	B			
	Anthraquinone blue green BXO powder.	B			
	Anthraquinone bluish green BX powder.	B			
864	Anthraquinone green GXNO powder.		1,161		Germany, 100 per cent.
	Anthraquinone green GXNO	B			
	Anthraquinone green GXNO powder.	B			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of tity).
			Quantity.	Invoice value.	
			Pounds.		
865	Alizarin direct green G		36,534	$80,149	Germany, 94 pe
	Alizarin cyanine green E. conc. 80/100.	By			Italy, 3 per Belgium, 3 pe
	Alizarin cyanine green E powder 11294.	By			
	Alizarin cyanine green E conc. powder 80/100 11294A.	By			
	Alizarin cyanine green G	Q			
	Alizarin cyanine green G extra	By			
	Alizarin cyanine green G powder 749.	By			
	Alizarin cyanine green G extra powder.	By			
	Alizarin cyanine green G extra powder.	B			
	Alizarin cyanine green G extra powder 749.	By			
	Alizarin cyanine green G extra powder 11292.	By			
	Alizarin cyanine green G extra powder 11292(P1).	By			
	Alizarin cyanine green G extra powder 11292(V).	By			
	Alizarin cyanine green G extra 24498 powder 11302(P1).	By			
	Alizarin cyanine green G extra powder conc. 11291B(V).	By			
	Alizarin cyanine green G extra powder conc. 70/100 11291A.	By			
	Alizarin cyanine green G extra powder conc. 80/100 11291.	By			
	Alizarin cyanine green G extra powder conc. 80/100 11291B.	By			
	Alizarin cyanine green G extra powder conc. 80/100 11291B (V).	By			
	Alizarin cyanine green CG extra.	K			
	Alizarin direct green 5G	M			
867	Indanthrene brown (single strength)		11,558		Germany, 77 pe Italy, 23 per
	Indanthrene brown B double paste.	B			
	Indanthrene brown B double paste Basf.	B			
868	Cibanone brown V paste		110		Switzerland, cent.
	Cibanone brown V powder pat.	I			
869	Algol brown B (single strength)		4,645	9,015	Germany, 100 p
	Algol brown R paste	By			
	Algol brown paste 11744(P1)	By			
	Algol brown R paste 10/100-11744(III).	By			
	Algol brown R powder 11599 (III).	By			
870	Algol corinth R (single strength)		2,037	1,364	Do.
	Algol corinth R paste 10 per cent 11750 (III).	By			
	Algol corinth R powder	By			
	Algol corinth R powder 1765	By			
	Algol corinth R powder 11571	By			
	Algol corinth R powder 11571 (III).	By			
873	Helindone brown AN (single strength).		27,423	41,738	Germany, 98 p Italy, 2 per c
	Helindone brown AN paste	M			
	Indanthrene pink B paste	B			
	Indanthrene pink B paste sand free.	B			
	Indanthrene pink B paste fine	B			
	Indanthrene pink B double paste.	B			
	Indanthrene pink BS powder	B			
	Indanthrene red violet RRN paste.	B			
	Indanthrene red violet RRN paste sand free.	B			
	Indanthrene red violet RRN powder.	B			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Hilts No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
873	Helindone brown AN (single strength)—Continued.		*Pounds.*		
	Indanthrene red violet 2RN paste.	B			
	Indanthrene red violet 2RN paste sand free.	Q			
	Indanthrene red violet RRNP paste.	B			
	Indanthrene red violet RRNP powder.	B			
874	Indigo, synthetic		70,975	$84,901	
881	Ciba blue 2B		99,937	126,817	Switzerland, 97.5 per cent; England, 2 per cent; Germany, 0.5 per cent.
	Ciba blue 2B powder	I			
	Ciba blue 2B powder pat	I			
	Ciba blue 2B pat	I			
	Ciba blue BB powder	Q			
	Ciba blue 2BD paste	I			
	Ciba blue 2BD paste 16/100	I			
	Ciba blue 2BD paste pat	I			
	Ciba blue 2BD paste 16/100 pat	I			
	Durindone blue 4B 20/100 paste	BD			
	Durindone blue 4B	BD			
	Indigo KB 20/100 paste	K			
882	Ciba blue G		340	905	Switzerland, 98 per cent; England, 2 per cent.
	Ciba blue G powder	I			
	Durindone blue 5B	BD			
883	Indigo KG (single strength)		3,811	2,161	Germany, 61 per cent; England, 14 per cent; Italy, 25 per cent.
	Indigo 6B powder	M			
	Indigo MLB 6B powder	M			
	Durindone blue 6B	BD			
885	Brilliant indigo BD paste		12,656	7,870	Germany, 93 per cent; Italy, 7 per cent.
	Brilliant indigo BD paste	B			
	Brilliant indigo B paste	B			
	Brilliant indigo B paste base	B			
	Brilliant indigo BB paste 20/100	B			
891	Ciba green		441		Switzerland, 100 per cent.
	Ciba green G paste 10/100	I			
892	Helindone green G		2,159	12,097	Germany, 100 per cent.
	Helindone green G paste	M			
	Helindone green G powder	M			
893	Alizarin indigo G		1,776		England, 72 per cent; Germany, 28 per cent.
	Alizarin indigo G paste 1628	By			
	Alizarin indigo G paste 20/100	By			
894	Alizarin indigo B		99		Germany, 100 per cent.
	Alizarin indigo B paste	K			
895	Alizarin indigo 3R		1,799		Do.
	Alizarin indigo 3R paste	By			
	Alizarin indigo 3R paste 16/100 11550 OA.	By			
897	Ciba heliotrope B		110		Switzerland, 100 per cent.
	Ciba heliotrope B powder paste.	I			
899	Ciba gray		440	2,139	Do.
	Ciba gray B powder pat	I			
	Ciba gray G powder pat	I			
901	Ciba violet B		21,987	36,643	Do.
	Ciba violet B paste	I			
	Ciba violet B paste 10/100	I			
	Ciba violet B paste 10/100 pat	I			
	Ciba violet B paste pat	I			
	Ciba violet B powder pat	I			
	Ciba violet R paste	I			
	Ciba violet R paste 10/100 pat	I			
	Ciba violet R paste pat	I			
	Ciba violet R powder pat	I			
902	Helindone brown 2R (single strength).		5,206	9,813	Germany, 100 per cent.
	Helindone brown 2R paste	M			
	Helindone brown 2R paste 10/100	M			
	Helindone brown 2R powder	M			
904	Helindone brown G (single strength)		4,857	4,853	Do.
	Helindone brown G paste	M			
	Helindone brown G powder	M			
	Helindone brown CR paste	M			
	Helindone brown CH paste	M			
905	Thio indigo scarlet R		554	1,206	England, 92 per cent; Germany, 8 per cent.
	Thio indigo scarlet R powder	K			
	Durindone scarlet R	BD			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of or (percentage of q tity).
			Quantity.	Invoice value.	
			Pounds.		
906	Thio indigo scarlet G		6,122	$6,888	Switzerland, 73
	Thio indigo scarlet 2G paste	K			cent; Germany,
	Thio indigo scarlet 2G paste 20/100.	K			per cent.
	Ciba red G powder	I			
	Ciba red G paste pat	I			
	Ciba red G paste pat. 10/100	I			
907	Ciba scarlet		10,283	24,850	Switzerland, 100
	Ciba scarlet G extra paste	I			cent.
	Ciba scarlet G extra paste 20/100.	I			
	Ciba scarlet G extra paste pat	I			
	Ciba scarlet G extra powder pat.	I			
908	Ciba red R paste 20 per cent	I	110		Do.
910	Helindone pink		31,813	56,249	Germany, 80 per
	Thio indigo pink AN paste	K			England, 12 per
	Thio indigo rose AN paste	K			Holland, 6 per
	Thio indigo rose BN paste	K			Italy, 2 per cent.
	Helindone pink AN paste	M			
	Helindone pink AN paste 10/100.	M			
	Helindone pink BN paste	M			
	Helindone pink BN paste 10/100	M			
912	Thio indigo red B paste (single strength).		5,995	5,897	Germany, 66 per England, 34 per
	Thio indigo red B paste	K			
	Thio indigo red B paste 20/100	K			
	Thio indigo red B powder	K			
	Thio indigo red B powder 100 per cent.	K			
	Durindone red B	BD			
913	Helindone orange R		919	17,759	Germany, 100 per
	Thio indigo orange R paste	K			
	Helindone orange R paste 10/100	M			
	Helindone orange R powder	M			
914	Helindone orange D powder	M	33		Do.
917	Helindone red B powder		549		Do.
	Helindone red B paste	M			
	Helindone red B paste 20/100	M			
918	Helindone red 3B		17,566		Do.
	Helindone red 3B paste	M			
	Helindone red 3B paste 20/100	M			
919	Ciba Bordeaux B		4,625	22,772	Switzerland, 100
	Ciba Bordeaux B	I			cent.
	Ciba Bordeaux B paste	I			
	Ciba Bordeaux B powder	I			
920	Helindone violet		2,425	9,324	Germany, 100 per
	Helindone violet B paste	M			
	Helindone violet B powder	M			
	Helindone violet BH paste	M			
	Helindone violet 2B paste 20/100.	M			
	Helindone violet 2B powder	M			
921	Helindone gray 2BBR		882		Do.
	Helindone gray BB paste	M			
923	Ursol		3,675	6,775	Do.
	Ursol D	A			
	Ursol DB	A			
	Ursol DF	A			
	Ursol P	A			
	Ursol SB crystals	A			
	Ursol SLA	A			
	Ursol 4G	A			
	Ursol 4R	A			
	Ursol A lumps	A			
	Ursol D lumps	A			
	Ursol gray AL	A			
	Ursol gray B	A			
	Ursol gray G	A			
	Ursol gray R	A			
	UNIDENTIFIED VAT COLORS.				
	Algol blue C		3,045	$1,385	Germany, 100 per
	Algol blue C paste 11739(IV) 10/100.	By			
	Algol blue C powder 11739a	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED VAT COLORS—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Algol brown G powder 11600	By	35		Germany, 100 per cent.
Algol yellow 8 paste	K	498		Do.
Chloranthrene Bordeaux 12½ per cent.	BD	10		England, 100 per cent.
Chloranthrene red 5GY paste	BD	10		Do.
Ciba Rosa		1,870	$4,937	Switzerland, 100 per cent.
Ciba Rosa BG paste	I			
Ciba Rosa BG powder	I			
Ciba Rosa BG powder patent	I			
Duranthrene blue RDX	BD	10		England, 100 per cent.
Duranthrene brown B	BD	10		Do.
Duranthrene dark blue BO	BD	10		Do.
Duranthrene red violet		2,274		Do.
Duranthrene red violet 2RN	BD			
Durindone red Y	BD	10		Do.
Helindone black 3B	M	4,409		Germany, 100 per cent.
Helindone red BB	M	152		England, 100 per cent.
Indanthrene blue		3,790	1,032	Germany, 100 per cent.
Indanthrene blue RZ paste	B			
Indanthrene blue G2Z powder	B			
Indanthrene blue GGSNP quintriple powder.	B			
Indanthrene brown 3R paste, fine	B	463		Do.
Indanthrene golden orange		1,223		Do.
Indanthrene golden orange RN extra paste.	B			
Indanthrene golden orange 3R paste.	B			
Indanthrene pink		104		Italy, 53 per cent; Belgium, 47 per cent.
Indanthrene pink BS powder	Q			
Indanthrene violet		3,817		England, 62 per cent; Belgium, 33 per cent; Germany, 5 per cent.
Indanthrene violet BN extra paste.	B			
Indanthrene violet BN extra paste.	Q			
Indanthrene yellow GN extra paste.	B	1,138		Germany, 100 per cent.
Indigo		2,590		England, 100 per cent.
Indigo LL 2R	BD			
Indigo LL powder	BD			
Thio indigo violet 2R paste	K	687		Germany, 100 per cent.
Vat pink		200		Do.
Vat pink AN paste	B			

UNIDENTIFIED ACID DYES.

Acetyl red		610		Germany, 100 per cent.
Acetyl red BBX	B			
Acetyl red GX	B			
Acid blue		2,565	$5,143	Switzerland, 90 per cent.
Acid blue A	K			Germany, 10 per cent.
Acid blue RBF	I			
Acid brown D speine	C	425		Germany, 100 per cent.
Acid Magenta N	Q	50		
Acid milling black		10,165		Switzerland, 100 per cent.
Acid milling black B	G			
Acid milling black B 652	G			
Acid milling red		2,975		Do.
Acid milling red R conc. 666	G			
Acid milling red G conc. 631	G			
Acid pure blue R supra 614	G	110		Do.
Acid ponceau E 640	G	529		Do.
Acid red		3,681	1,553	Germany, 100 per cent.
Acid red B	K			
Acid red 2B	K			
Acid red 4B	K			
Acid red 8DG 20/100	M			
Acid rhodamine		4,166	11,887	Switzerland, 52 per cent; Germany, 48 per cent.
Acid rhodamine BG	B			
Acid rhodamine R	I			
Acid rhodamine 3R	I			
Acid rhodamine 3R conc	I			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
	Acid violet		275	$97	Germany, 92 per cent; France, 8 per cent.
	Acid violet 6B	M			
	Acid violet 6B SX extra	C			
	Acid violet 7B	Q			
	Alizarin blue soluble (powder)	Q	1,120		England, 100 per cent.
	Alizarin brilliant green KG	C	84		Do.
	Alizarin cyanole		668		Germany, 100 per cent.
	Alizarin cyanole EF	C			
	Alizarin cyanole SR	C			
	Alizarin direct violet		1,338		Do.
	Alizarin direct violet E2B	M			
	Alizarin direct violet RC	M			
	Alizarin delphinol		1,472		England, 100 per cent.
	Alizarin delphinol BS	BD			
	Alizarin emeraldole		991	2,352	Germany, 100 per cent.
	Alizarin emeraldole G	By			
	Alizarin emeraldole G powder	By			
	Alizarin emeraldole G powder 1340.	By			
	Alizarin emeraldole G powder (VI) 11349.	By			
	Alizarin rubinol GW powder	By	1,764		Do.
	Alizarin saphirole		6,540	20,859	Switzerland, 90 per cent; Germany, 3 per cent; Belgium, 5 per cent.
	Alizarin saphirole SAP	S			
	Alizarin saphirole BL powder	By			
	Alizarin saphirole WSA	By			
	Alizarin sky blue	K	249		Germany, 100 per cent.
	Alizarin uranole R powder	By	622		Do.
	Alkali fast green		328		Germany, 70 per cent; Holland, 30 per cent.
	Alkali fast green 3G conc. 33/100.	By			
	Alkali fast green 3G conc. 33/100 10553A.	By			
	Alphanol blue 5RN	C	100		Germany, 100 per cent.
	Alphanol brown R, 135 per cent	C	273		Do.
	Amido azo black EG	M	100		Do.
	Amido red BL	M	100		Do.
	Anthra cyanine 3FL, conc. 40/100	By	132		Do.
	Anthosine		928	3,732	Do.
	Anthosine B	B			
	Anthosine 3B	B			
	Anthosine 5B	B			
	Azo acid black 8BL extra	M	1,001		Do.
	Azo carmine I	B	57		Do.
	Azo cyanine		573	954	Do.
	Azo cyanine GR	K			
	Azo cyanine GR extra	K			
	Azo cyanine 5R	K			
	Azo cyanole wool blue GR	K	125		Do.
	Azo milling yellow 5G	Gr. E	100		Do.
	Azo rhodine		1,532	2,396	Switzerland, 100 per cent.
	Azo rhodine 2B	S			
	Azo rhodine 6B	S			
	Azo rhodine 2G	S			
	Brilliant black blue R	K	100		Germany, 100 per cent.
	Blue FS	C	201		Do.
	Brilliant carmine L conc	B	100		Do.
	Brilliant lanafuchsine BB	C	117		Do.
	Brilliant milling blue B, 100 per cent.	Q	110		England, 100 per cent.
	Brilliant milling red		278		Germany, 100 per cent.
	Brilliant milling red	C			
	Brilliant milling red G	C			
	Brilliant pure yellow 6G extra 1648	By	49		Do.
	Brilliant scarlet FB concentrated	Q	2,205		France, 100 per cent.
	Cerise acid	Q	22		Do.
	Chloramine brilliant red 8B	S	110		Switzerland, 100 per cent.
	Citromine		320	390	Do.
	Citromine O	S			
	Citromine OOO	I			
	Cloth fast blue		16,490	17,470	Do.
	Cloth fast blue B extra	I			
	Cloth fast blue BB	I			
	Cloth fast blue GTB	I			
	Cloth fast blue R	I			
	Cloth fast blue R extra	I			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Cloth fast green G	I.	4		Switzerland, 100 per cent.
Cloth fast orange G conc	I.	110		Do.
Cloth fast red GR conc	I.	110		Do.
Coomassie fast black B	BD.	1,000		England, 100 per cent.
Coomassie violet R	BD.	1,120		Do.
Dark eosine 6R, 60 crystals	M.	807		Germany, 100 per cent.
Durasol acid blue B	BD.	13,454		England, 100 per cent.
Erio Chicago red 111	G.	992		Switzerland, 100 per cent.
Erio dark blue R conc. 673	G.	1,102		Do.
Erio fast blue (paste)	G.	970		Canada, 100 per cent.
Erio fast cyanine S conc. 672	G.	55		Switzerland, 100 per cent.
Erio fast purple paste	G.	501		Canada, 100 per cent.
Erio flavine 2G conc. 575	G.	1,389		Switzerland, 100 per cent.
Erio floxine 6B conc. 576	G.	705		Do.
Erio green BB supra 661	G.	5,810		Do.
Erio rubine 2B conc. 646	G.	11,838		Do.
Erio violet		8,631	$12,952	Do.
Erio violet BC 505	G.			
Erio violet BC 505 95/100	G.			
Erio violet RL supra 625	G.			
Erio violet RL 670	G.			
Erythrine BG	M.	403		Germany, 100 per cent.
Formic black TG conc. 392	G.	110		Switzerland, 100 per cent.
Gloria black N conc. 60/100	By.	240		Germany, 100 per cent.
Hydiasine yellow 1EG	GrE.	100		Do.
Ink blue BITBNoo	GrE.	3,535		Do.
Kiton fast orange G	I.	661		Switzerland, 100 per cent.
Kiton fast red R	I.	110		Germany, 100 per cent.
Kiton fast yellow		8,843		Switzerland, 100 per cent.
Kiton fast yellow 3G	I.			
Kiton fast yellow	I.			
Kiton red		11,518	16,258	Do.
Kiton red conc	I.			
Kiton red G	I.			
Kiton red G conc	I.			
Kiton red 6B	I.			
Kiton red S	I.			
Kiton yellow 3G	I.	1,102		Do.
Milling yellow GA	A.	50		Germany, 100 per cent.
Naphthalene black AB	P.	24		France, 100 per cent.
Naphthalene blue B	M.	200		Germany, 100 per cent.
Naphthalene green NV	P.	220		France, 100 per cent.
Navy blue A	I.	1,323		Switzerland, 100 per cent.
Nerol 2B	A.	500		Germany, 100 per cent.
Nerol black 2B	K.	112		Do.
Palatine light yellow RX	B.	411		Do.
Polar red G conc. 596	G.	2,094		Switzerland, 100 per cent.
Ponceau 4R	Q.	50		England, 100 per cent.
Pure blue conc	M.	25		Germany, 100 per cent.
Quinoline yellow KT extra conc. 1617	By.	1,102		Do.
Rocceline scarlet	Q.	22		France, 100 per cent.
Seto flavine T 393	G.	110		Switzerland, 100 per cent.
Silk scarlet	S.	50		Do.
Special blue G	B.	130		Germany, 100 per cent.
Sulphon yellow		1,294		Do.
Sulphon yellow R. conc. 10469	By.			
Sulphon yellow R. conc. 30/100 10469A.	By.			
Sulphon yellow R. conc. 35/100 10469C.	By.			
Supramine black BR 1598	By.	49		Do.
Toane fast red		882		Do.
Toane fast red 2BL	K.			
Toane fast red 6BL	K.			Do.

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of tity).
			Quantity.	Invoice value.	
			Pounds.		
	Victoria scarlet		2,335		Germany, 100 per
	Victoria scarlet K2Z	M			
	Victoria scarlet K3G	M			
	Victoria yellow	Q	9		
	Violet for wool 8B double conc	Q	275		Belgium, 100 per
	Wool blue RL 647	G	30,876		Switzerland, 10 cent.
	Wool fast marine blue BB	B	50		Germany, 100 per
	Wool fast yellow G	B	101		Do.
	Xylene blue	S	110		Switzerland, 10 cent.

UNCLASSIFIED MORDANT AND CHROME DYES.

	Acid alizarin black		6,670	$4,443	Germany, 85 per
	Acid alizarin black ENT conc	M			Switzerland, 1
	Acid alizarin black ET	M			cent.
	Acid alizarin black R	S			
	Acid alizarin black SET powder	M			
	Acid alizarin black SN	M			
	Acid alizarin brown		2,054		Germany, 100 pe
	Acid alizarin brown B	M			
	Acid alizarin brown RR	M			
	Acid alizarin gray		2,818		Do.
	Acid alizarin gray G	M			
	Acid alizarin gray S	M			
	Acid alizarin green 2B	M	379		Do.
	Alizarin black		4,136	3,293	Do.
	Alizarin black B	K			
	Alizarin black SF	B			
	Alizarin black SP paste	B			
	Alizarin blue		5,802	1,688	Germany, 55 per
	Alizarin blue	Q			England, 38 per
	Alizarin blue F	M			Holland, 7 per
	Alizarin blue RR	M			
	Alizarin blue SBW	M			
	Alizarin blue SCB paste 20/100	Q			
	Alizarin blue SW powder 11390 (PV).	By			
	Alizarin blue WC paste	B			
	Alizarin blue WNN paste	B			
	Alizarin blue black		1,066		Germany, 100 pe
	Alizarin blue black BB double paste.	B			
	Alizarin blue black BT powder	B			
	Alizarin cyanine green		4,861	1,143	Do.
	Alizarin cyanine green EFP powder.	By			
	Alizarin cyanine green 3G powder.	By			
	Alizarin cyanine green 3G powder 11297(P1).	By			
	Alizarin dark blue WW paste	B	4,418		Do.
	Alizarin fast black SP powder (11368)	By	432		Do.
	Alizarin geranole B powder	By	1,482		
	Alizarin green		1,045	579	England, 86 per
	Alizarin green 15 paste	M			Germany, 14
	Alizarin green BGX 10/100	Q			cent.
	Alizarin green AGS 15/100	Q			
	Alizarin indole R powder 1130	By	99		Germany, 100 per
	Alizarin red		6,177	284	Do.
	Alizarin red 2AG	M			
	Alizarin red CR 20/100	M			
	Alizarin red 5F 20/100	M			
	Alizarin red PS powder 11378 (P1).	By			
	Alizarin red SS powder	B			
	Alizarin red WR paste	B			
	Anthracene acid black 3R	C	1,065		Do.
	Anthracene acid blue		543		Do.
	Anthracene acid blue ER	C			
	Anthracene acid blue KBB	C			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED MORDANT AND CHROME DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Anthracene blue R double paste	B	25		Germany, 100 per cent.
Anthracene blue black UG	C	377		Do.
Anthracene brown WLP paste	BD	6,720		England, 100 per cent.
Anthracene chromate brown		8,603		Germany, 100 per cent.
Anthracene chromate brown EB.	C			
Anthracene chromate brown EB 100 per cent.	C			
Anthracene chromate brown EB extra.	C			
Anthracene chromate brown EB extra 90 per cent.	C			
Anthracene chrome black		2,041	$180	Do.
Anthracene chrome black KLT	C			
Anthracene chrome black KV	C			
Anthracene chrome black PBB	C			
Anthracene chrome black 5611Z	C			
Anthracene chrome blue H	C	670		Do.
Anthracene chrome brown SWN	C	1,120		Do.
Anthracene dark blue	B		284	Do.
Brilliant milling blue B	C	571		
Chromal blue GC (for printing) 939	G	220		Switzerland, 100 per cent.
Chromacetin blue S pdr	DH	110		Do.
Chrome black AGZZ	K	741		Germany, 100 per cent.
Chrome blue S	G	2,756		Switzerland, 100 per cent.
Chrome Bordeaux B powder	DH	100		Do.
Chrome fast blue 2R	I	220		Do.
Chrome fast brilliant Cyanine R	I	1		Do.
Chrome fast brown		1,543		Do.
Chrome fast brown	I			
Chrome fast brown TV	I			
Chrome fast green GL	I	220		Do.
Chrome fast violet B	I	441		Do.
Chromazurine G powder	DH	55		Do.
Chromochlorine G powder	DH	220		Do.
Chromorhoduline		310	1,511	Do.
Chromorhoduline B powder	DH			
Chromorhoduline 6G extra powder	DH			Do.
Chromosafranine B powder	DH	100		Do.
Coeruleine H powder	B	242		Germany, 100 per cent.
Erio chrome black	G	7,055		Switzerland, 100 per cent.
Erio chrome blue S 955	G	110		Do.
Erio chrome brown ROS 933	G	1,213		Do.
Erio chrome flavine A conc. 1015	G	110		Do.
Erio chrome green HK 1031	G	551		Do.
Erio chrome red PE1 1035	G	485		Do.
Erio chrome violet		4,828		Do.
Erio chrome violet B 918	G			
Erio chrome violet 3B 941	G			
Fast chrome green B powder	DH	110		Do.
Lanasol brown 2R pat	I	220		Do.
Lanasol green G		885		Do.
Lanasol green G	I			
Lanasol green G conc	I			
Lanasol orange		353	505	Do.
Lanasol orange 2G	I			
Lanasol orange 2R	I			
Lanasol red		881		Do.
Lanasol red G	I			
Lanasol red G. conc	I			
Lanasol violet		440	536	Do.
Lanasol violet B paste	I			
Lanasol violet R paste	I			
Lanasol yellow		1,322		Do.
Lanasol yellow G paste	I			
Lanasol yellow G conc	I			
Metachrome blue black		725	710	Germany, 100 per cent.
Metachrome blue black 2BX	A			
Metachrome blue black R	A			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED MORDANT AND CHROME DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of tity).
			Quantity.	Invoice value.	
			Pounds.		
	Monochrome brown		1,888		Germany, 100 per
	Monochrome brown E	K			
	Monochrome brown E 286 per cent	K			
	Mordant fast yellow E powder	B	50		Do.
	Mordant yellow conc	M	1,104		Do.
	Mounsey olive brown		1,060		England, 100 per
	Mounsey olive brown	Q			
	Mounsey olive brown G powder	Q			
	Omega chrome brown PB conc	S	882		Switzerland, 10 cent.
	Salicine blue black AE	K	1,102		Germany, 100 pe
	Salacine Bordeaux RF	K	50		Do.
	Salicine brown RE	K	200		Do.

UNCLASSIFIED DIRECT DYES.

	Azo diamine orange 2R	Q	342		Italy, 100 per ce
	Benzo bronze E		331		Do.
	Benzo bronze E	By			
	Benzo bronze E 1996	B			
	Benzo chrome black blue B conc. 50/100.	By	125		Germany, 100 pe
	Benzo chrome blue black		475		Germany, 86 per
	Benzo chrome blue black B	By			France, 14 per
	Benzo chrome blue black B conc.	P			
	Benzo chrome brown		2,890	$3,739	Germany, 72 pe
	Benzo chrome brown B	By			England, 28 pe
	Benzo chrome brown B 670	By			
	Benzo chrome brown G	By			
	Benzo chrome brown G 671	By			
	Benzo chrome brown 5G 10211	By			
	Benzo chrome brown 5 G (VI) 10211.	By			
	Benzo fast black		2,769	3,918	Germany, 88 pe
	Benzo fast black	By			Belgium, 12 pe
	Benzo fast black L	By			
	Benzo fast black L(1425)	By			
	Benzo fast black L(10268)	By			
	Benzo fast black L conc. 78/100	By			
	Benzo fast black S	K			
	Benzo fast blue		2,622	6,705	Germany, 95 pe
	Benzo fast blue FFL	By			England, 5 per
	Benzo fast blue FFL 10179	By			
	Benzo fast blue FFL	B			
	Benzo fast Bordeaux 6BL	Q	22		Italy, 100 per ce
	Benzo fast brown		2,311	4,247	Germany, 100 pe
	Benzo fast brown GL 10258	By			
	Benzo fast brown RL	By			
	Benzo fast brown RL 10257	By			
	Benzo fast heliotrope		2,189	5,923	Do.
	Benzo fast heliotrope BL	By			
	Benzo fast heliotrope BL conc. 50/100, 10207A	By			
	Benzo fast heliotrope 4BL	By			
	Benzo fast heliotrope 4BL 1759	By			
	Benzo fast heliotrope 2RL	By			
	Benzo fast heliotrope 2RL 10208.	By			
	Benzo fast heliotrope 2RL 10208(VI).	By			
	Benzo fast orange		887	1,976	Do.
	Benzo fast orange 2RL	By			
	Benzo fast orange 2RL 10086	By			
	Benzo fast orange S 70/100	By			
	Benzo heliotrope	K	50		Do.
	Benzo red		578		Holland, 89 per
	Benzo red 12B	By			Germany, 11 p
	Benzo red 12B 10009(VI)	By			
	Benzo red 12B conc. 50/100	By			
	Benzo rhoduline red		3,950	785	Germany, 94 pe
	Benzo rhoduline red	K			Italy, 6 per ce
	Benzo rhoduline red B	By			
	Benzo rhoduline red B conc. 30/100.	By			
	Benzo rhoduline red 3B	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Benzoform scarlet B (10307)	By	522		Germany, 100 per cent.
Brilliant benzo green B 936	By	198		Do.
Brilliant benzo violet		1,428	$3,982	Do.
Brilliant benzo violet B	By			
Brilliant benzo violet B 50/100	By			
Brilliant benzo violet B 1389	By			
Brilliant benzo violet B 10205 (P III).	By			
Brilliant benzo violet 2R 1388	By			
Brilliant benzo violet 2R conc. 40/100.	By			
Brilliant copper blue GW	A	100		Do.
Brilliant fast blue		1,463	4,448	Do.
Brilliant fast blue 2G conc. 60/100.	By			
Brilliant fast blue B	By			
Brilliant fast blue 2G conc. 60/100 10182A.	By			
Brilliant fast blue 3X 1577	By			
Brilliant sky blue		3,968	4,355	Germany, 51 per cent. England, 49 per cent.
Brilliant sky blue 8G extra	Q			
Brilliant sky blue 2RM	By			
Chicago red 111	G	551		Switzerland, 100 per cent.
Chloramine brilliant red		2,351	10,255	Do.
Chloramine brilliant red	S			
Chloramine brilliant red 8B	S			
Chloramine brilliant red 8B conc.	S			
Chloramine brilliant red 8B conc. pure.	S			
Chloramine red		3,378	6,209	Germany, 52 per cent; Italy, 30 per cent; Switzerland, 15 per cent; England, 3 per cent.
Chloramine red B	S			
Chloramine red 8BS	By			
Chloramine red 8BS conc. 60/100.	By			
Chlorantine fast black		1,102		Switzerland, 100 per cent.
Chlorantine fast black B	I			
Chlorantine fast black B conc.	I			
Chlorantine fast blue		5,511	15,534	Do.
Chlorantine fast blue 2GL	I			
Chlorantine fast blue 2GL conc.	I			
Chlorantine fast blue RL conc.	I			
Chlorantine fast Bordeaux		2,534		Do.
Chlorantine fast Bordeaux 2BL	I			
Chlorantine fast Bordeaux 2BL conc.	I			
Chlorantine fast brown		4,589	9,398	Do.
Chlorantine fast brown 3GL	I			
Chlorantine fast brown RL	I			
Chlorantine fast brown RL conc.	I			
Chlorantine fast orange		2,348		Do.
Chlorantine fast orange TRL conc.	I			
Chlorantine fast orange TRL	I			
Chlorantine fast red		3,072		Do.
Chlorantine fast red 7BL	I			
Chlorantine fast red 7BL conc.	I			
Chlorantine fast red 7BL conc. pat.	I			
Chlorantine fast rubine		440		Do.
Chlorantine fast rubine RL conc.	I			
Chlorantine fast rubine RL paste.	I			
Chlorantine fast violet		5,622	10,171	Do.
Chlorantine fast violet BL	I			
Chlorantine fast violet BL conc.	I			
Chlorantine fast violet 4BL	I			
Chlorantine fast violet 4BL conc. pat.	I			
Chlorantine fast violet 2RL	I			
Chlorantine fast violet 2RL pat	I			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
	Chlorantine fast yellow		3,637	$7,642	Switzerland, 100 per cent.
	Chlorantine fast yellow 4GL	I.			
	Chlorantine fast yellow 4GL conc.	I.			
	Chlorantine fast yellow RL	I.			
	Chlorantine light blue 2GL	I.	441		Do.
	Chlorantine light yellow 4GL	I.	441		Do.
	Chlorantine orange TRL	I.	661		Do.
	Chlorazol brown		3,540	4,258	England, 100 per cent.
	Chlorazol brown G	BD.			
	Chlorazol brown GM	BD.			
	Chlorazol brown RD	BD.			
	Chlorazol fast red K	BD.	2,150		Do.
	Chlorazol violet R	BD.	300		England, 100 per cent.
	Chronanile black 2F extra	A.	300		Germany, 100 per cent.
	Columbia bordeaux B	A.	112		Do.
	Columbia violet R	A.	100		Do.
	Copper blue B extra	M.	776		Do.
	Cotton brown W	C.	686		Do.
	Cupranil brown R	I.	1,102		Switzerland, 100 per cent.
	Diamine azo scarlet		231	29	Germany, 100 per cent.
	Diamine azo scarlet A	C.			
	Diamine azo scarlet BBL extra	C.			
	Diamine brilliant orange SS	C.	710		Do.
	Diamine catechine		3,448	5,844	Do.
	Diamine catechine B	C.			
	Diamine catechine 3G	C.			
	Diamine catechine GR conc	C.			
	Diamine catechine GXN	C.			
	Diamine fast black X	C.	5		Do.
	Diamine fast blue		1,768		
	Diamine fast blue FFB	C.			
	Diamine fast blue FFB	K.			
	Diamine fast Bordeaux 6BA	C.	331		Do.
	Diamine azo orange RR	C.	541		Do.
	Diamine fast orange		1,014	1,393	Do.
	Diamine fast orange EG	C.			
	Diamine fast orange ER	C.			
	Diamine fast rose		117	21	Do.
	Diamine fast rose BBF	C.			
	Diamine fast rose G	C.			
	Diamine fast scarlet 8BN	C.	236		Do.
	Diamine phosphine D	C.	50		Do.
	Diamine purpurine 6B	C.	278		Do.
	Diamine steel blue L	C.	11		Do.
	Diamine yellow	Q.	500		France, 100 per cent.
	Diaminogene blue NA	C.	1,374		Germany, 69 per cent; Italy, 31 per cent.
	Dianil chrome brown R	M.	500		Germany, 100 per cent.
	Dianil red 10B	M.	611		Do.
	Dianil yellow	C.	276		Do.
	Dianil violet		1,029		Do.
	Dianil violet BE	M.			
	Dianil violet BE conc	M.			
	Dianol Dark blue B	BD.	2,240		England, 100 per cent.
	Dianol fast blue 2B	BD.	1,000		Do.
	Dianol fast orange D	BD.	1,120		Do.
	Dianol fast red K	BD.	500		Do.
	Dianol violet R	BD.	1,120		Do.
	Diazo bordeaux		1,126	1,582	Germany, 100 per cent.
	Diazo bordeaux	By.			
	Diazo bordeaux Pi 10401	By.			
	Diazo bordeaux 7B	By.			
	Diazo bordeaux 7B C160	By.			
	Diazo bordeaux 7B C598	By.			
	Diazo bordeaux 7B 1312	By.			
	Diazo brilliant orange		424	525	England, 70 per cent; Germany, 30 per cent.
	Diazo brilliant orange GR extra	M.			
	Diazo brilliant orange GR extra 1716.	By.			
	Diazo brilliant orange 5G extra	By.			
	Diazo brilliant scarlet		2,004	5,261	Germany, 66 per cent; England, 34 per cent.
	Diazo brilliant scarlet extra BA	By.			
	Diazo brilliant scarlet extra BA	K.			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

sults No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
	Diazo brilliant scarlet—Continued.		*Pounds.*		
	Diazo brilliant scarlet 4BL extra conc.	By			
	Diazo brilliant scarlet 2BL extra conc. 1344.	By			
	Diazo brilliant scarlet 3B extra 1274.	By			
	Diazo brilliant scarlet 6B extra C602.	By			
	Diazo brilliant scarlet 6B extra 1275.	By			
	Diazo brilliant scarlet ROA extra.	By			
	Diazo brilliant scarlet 8AB	By			
	Diazo brilliant scarlet G	By			
	Diazo brown		211	$419	Germany, 100 per cent.
	Diazo brown G	By			
	Diazo brown 3G 1811	By			
	Diazo brown 3RB 1881	By			
	Diazo fast blue		1,102		Switzerland, 100 per cent.
	Diazo fast blue 2BW	I			
	Diazo fast blue 2BW conc	I			
	Diazo fast bordeaux		718		Germany, 100 per cent.
	Diazo fast bordeaux BL	By			
	Diazo fast bordeaux BL 1731	By			
	Diazo fast red 5BL 1875	By	99		Germany, 100 per cent.
	Diazo fast violet BL	By	198		England, 100 per cent.
	Diazo fast yellow		51		Germany, 100 per cent.
	Diazo fast yellow G 1798	By			
	Diazo fast yellow 2G	By			
	Diazo indigo blue 4GL extra 1730	By	22		Do.
	Diazo navy blue BP2S	GrE	110		Do.
	Diazo rubine		506		England, 80 per cent; Germany, 20 per cent.
	Diazo rubine B	By			
	Diazo rubine 1117	By			
	Diazo scarlet 3BA extra	Q	62		Italy, 100 per cent.
	Diazo sky black B	K	2,924		Germany, 100 per cent.
	Diazo sky blue		4,539	6,002	Germany, 97 per cent; Italy, 3 per cent.
	Diazo sky blue B	K			
	Diazo sky blue B 1528	By			
	Diazo sky blue 3G	By			
	Diazo sky blue 3G 1527	By			
	Diazo sky blue 3G powder	By			
	Diazo yellow R 1799	By	33		Germany, 100 per cent.
	Diazo blue black T	K	2,205		Do.
	Diazophenyl black		1,415	475	Switzerland, 100 per cent.
	Diazophenyl black 3B 381	G			
	Diazophenyl black V 360	G			
	Diphenyl fast blue		1,322		Switzerland, 100 per cent.
	Diphenyl fast blue FB conc. 383.	G			
	Diphenyl fast blue FB supra 379.	G			
	Diphenyl fast Bordeaux		595		Do.
	Diphenyl fast Bordeaux B conc.	G			
	Diphenyl fast Bordeaux G conc. 366.	G			
	Diphenyl fast grey BC 254	G	110		Do.
	Direct brown		5,632	3,303	Switzerland, 98 per per cent; England, 2 per cent.
	Direct brown 5G	I			
	Direct brown KR	Q			
	Direct brown TBS 818	G			
	Direct catechine GR conc	I	386		Switzerland, 100 per cent.
	Direct cutch brown		6,614	9,601	Do.
	Direct cutch brown B	I			
	Direct cutch brown B conc	I			
	Direct cutch brown GR	I			
	Direct cutch brown GR conc	I			
	Direct deep black T	By	99		Germany, 100 per cent.
	Direct fast black B	I	1,322		Switzerland, 100 per cent.
	Direct fast orange SE	I	441		Do.
	Direct fast scarlet 4BS	C	198		Germany, 100 per cent.

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of (percentage of tity).
			Quantity.	Invoice value.	
			Pounds.		
	Direct gray		996		France, 100 per c
	Direct gray F	P			
	Direct gray T	P			
	Direct safranine		440		Switzerland, 10
	Direct safranine RW	I			cent.
	Direct safranine RW conc	I			
	Indigene blue RW conc	I	110		Do.
	Naphthogene blue		304	$314	Italy, 72 per cent
	Naphthogene blue 2R	Q			land, 28 per cen
	Naphthogene blue 4R	Q			
	Naphthamine direct blue 2R	K	100		Germany, 100 per
	Naphthamine fast black		1,382		Do.
	Naphthamine fast black SF	K			
	Naphthamine fast black KSG extra.	K			
	Naphthamine fast brown BL	K	200		Do.
	Naphthogene blue		7,109		
	Naphthogene blue B	A			
	Naphthogene blue 2R	A			
	Naphthogene pure blue 4B	A	50		Do.
	Oxamine chrome violet SB	By	994		Do.
	Parasulfone brown G	S	882		Do.
	Pento black CF extra conc. 60/100	By	1,199		Do.
	Polyphenyl yellow RC 115	G	2,535		Switzerland, 10 cent.
	Pyrozol orange G	S	3,537		Do.
	Rosanthrene		881		Do.
	Rosanthrene B conc. pat	I			
	Rosanthrene R pat	I			
	Rosanthrene Bordeaux		1,322		Do.
	Rosanthrene Bordeaux B	I			
	Rosanthrene Bordeaux B pat	I			
	Rosanthrene orange		551		Do.
	Rosanthrene orange R conc	I			
	Rosanthrene orange R conc. pat	I			
	Rosanthrene Rosa	I	110		Do.
	Solamine blue FF	A	1,500		Germany, 100 pe
	Trinzol blue Booo	Q	331		
	Trisulfone bronze B	S	441		Switzerland, 10 cent.
	Zambesi black V	A	1,752		Germany, 100 pe
	Zambesi Bordeaux 7B	A	200		Do.
	Zambesi scarlet 6B extra	K	250		Do.

UNIDENTIFIED SULPHUR DYES.

	Cross dye green		51,074	$49,646	England, 100 per
	Cross dye green	BD			
	Cross dye green B	BD			
	Cross dye green 2G conc	BD			
	Cross dye yellow Y	BD	548		Do.
	Disulphine blue 87724	BD	2,240		Do.
	Eclipse brown		20,150	9,235	Switzerland, 10 cent.
	Eclipse brown BK 371	G			
	Eclipse brown 3GK	G			
	Eclipse brown 3GK 386	G			
	Immedial direct blue B	C	520		Germany, 100 pe
	Immedial indogene		2,379		Do.
	Immedial indogene B	C			
	Immedial indogene AGG extra conc.	C			
	Katigen bronze GL (XI)11536	By	6		Do.
	Katigen direct blue		12	7	Do.
	Katigen direct blue B extra conc. 11493(XI).	By			
	Katigen direct blue RF extra conc. 11493(XI).	By			
	Katigen yellow brown		12		Do.
	Katigen yellow brown RL 11520(XI).	By			
	Katigen yellow brown 3RL 11521(XI).	By			

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED SULPHUR DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Katigen yellow GR extra (XI)11453.	By	6		Germany, 100 per cent.
Pyrogene brown RS yellow shade	Q	243		Switzerland, 100 per cent.
Pyrogene catechine 2GO	I	1,102		Do.
Pyrogene cutch 2G	Q	500		Do.
Pyrogene cutch brown 2R extra	Q	110		Do.
Pyrogene direct blue RL	I	1,001		Do.
Thionine green GG	Q	9,797		England, 100 per cent.
Thiogene orange R	M	172		Italy, 100 per cent.
Thional yellow G	S	6,446		Switzerland, 100 per cent.
Thionol brilliant green 4GX	BD	6,720		England, 100 per cent.
Thionol brown		20,632	$9,927	Do.
Thionol brown GD	BD			
Thionol brown P	BD			
Thionol brown R	BD			
Thionol corinth RBX	BD	2,240		Do.
Thionol green Dy	BD	16,600		Do.
Thionol yellow		35,240	28,019	Do.
Thionol yellow GR	BD			
Thionol yellow 3RD	BD			
Thionone black 6R	BD	10		Do.

UNIDENTIFIED BASIC DYES.

Artificial silk black	I	1,202		Switzerland, 100 per cent.
Brilliant cresylblue 2BS 200 per cent.	L	55		Germany, 100 per cent.
Homophosphine red	Q	4		France, 100 per cent.
Methyl violet		263	$136	Germany, 100 per cent.
Methyl violet NFB	B			
Methyl violet V 3D	K			
New ethyl blue B	M	100		Do.

UNIDENTIFIED SPIRIT SOLUBLE AND COLOR LAKE DYES.

Autol orange 23 211 powder	B	5		Germany, 100 per cent.
Black base		180		Do.
Black base S	B			
Bronze lake	Q	99		Do.
Brilliant lake BB	Q	220		Do.
Fat orange		440	$765	Switzerland, 100 per cent.
Fat orange LG	G			
Fat orange R 8186	G			
Hansa rubine G powder	M	459		Germany, 100 per cent.
Hansa yellow		2,315	297	Do.
Hansa yellow 5G lumps	M			
Hansa yellow R paste	M			
Hansa yellow R paste 1918	M			
Helio Bordeaux		1,343	1,526	Do.
Helio Bordeaux BL powder	By			
Helio Bordeaux BL 1763	By			
Helio Bordeaux BL 20/100 paste 10837.	By			
Helio fast blue		1,143	1,788	Do.
Helio fast blue SL conc	Q			
Helio fast blue BL conc. 55/100 10867a.	By			
Helio fast violet		743		Do.
Helio fast violet AL	By			
Helio fast violet AL 1360	By			
Helio fast violet AL 10866a	By			
Helio violet solide	Q	251		France, 100 per cent.
Lake blue		1,102		Germany, 100 per cent.
Lake blue 14228	Q			
Lake blue 14228I powder	Q			
Lithol Bordeaux B paste	B	152		Do.

TABLE 14.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED SPIRIT SOLUBLE AND COLOR LAKE DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
	Lithol fast orange R powder	B	100		Germany, 100 per cent.
	Oil yellow R	B	5		Do.
	Pigment scarlet 3B conc	M	600		Do.
	Printers' red	Q	230		Do.
	Sudan 4GL	A	5		Do.
	Ursol gray R	A	10		Do.

UNIDENTIFIED, UNCLASSIFIED, SPECIAL DYES.

	Aniline dyes	Q	79		
	Anthracene GC paste sand free	B	800		Germany, 100 per cent.
	Berol 2B	A	500		Do.
	Bistre T powder	Q	2,756		France, 100 per cent.
	Brilliant bronze black B powder	Q	311		Germany, 100 per cent.
	Brilliant chrome leather black extra	M	716		Do.
	Bronze blue for laundry	B	50		Do.
	Bronze red L116	Q	100		Holland, 100 per cent.
	Eulan		220		Germany, 100 per cent.
	Eulan F	B			
	Eulan F2164	B			
	Euresin SB	M	20		Do.
	Gallo indigo blue S powder	Q	207		England, 100 per cent.
	Hydrazol orange G	S	351		Switzerland, 100 per cent.
	Indigo blue		1,761	$168	Germany, 100 per cent.
	Indigo blue 3BZ 90/100	C			
	Indigo blue X	Q			
	Light yellow G10526	B	40		Do.
	Nerocyanine 2BN	K	104		Do.
	Old gold aniline dyestuff	Q	500		England, 100 per cent.
	Pure blue for printing	I	5,622		Switzerland, 100 per cent.
	Rose aurore	Q	11		France, 100 per cent.
	Ursol brown		110		Germany, 100 per cent.
	Ursol brown 2GA	A			
	Violet dahlia	Q	11		France, 100 per cent.
	Violet rouge acid	Q	11		Do.
	Viridine green	Q	755		Germany, 100 per cent.
	"Jacqueminot nouveau"	Q	22		France, 100 per cent.
	Aniline color	Q	772		Do.
	All other dyes		26		

Directory of manufacturers of coal-tar products during 1921.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
1	Abbott Laboratories	4753 Ravenswood Avenue, Chicago, Ill.
2	Agawam Chemical Works (Inc.)	531 Grosvenor Building, Providence, R. I. (North Attleboro, Mass.).
3	Albany Chemical Co	2-24 Broadway, Albany, N. Y.
4	Althouse Chemical Co	540 Pear Street, Reading, Pa.
5	Amalgamated Dyestuff & Chemical Works (Inc.).	Plum Point Lane, Newark, N. J.
6	American Aniline Products (Inc.)	80 Fifth Avenue, New York City (Lock Haven, Pa.).
7	American Chemical Products Co	73 Chatham Street, Rochester, N. Y.
8	American Nitration Co. (Inc.)	River Road, Nutley, N. J.
9	American Tar Products Co	208 South La Salle Street, Chicago, Ill. (St. Louis, Mo.; Carrollville, Wis.; Youngstown, Ohio.; Follansbee, W. Va.; Woodward, Ala.).
10	American Vat Color Co	3223 South Western Boulevard, Chicago, Ill.
11	Ansbacher & Co., A. B. (Inc.)	527 Fifth Avenue, New York City. (Brooklyn, N. Y.)
12	Arista Chemical Co. (Inc.)	305 Broadway, New York City. (Brooklyn, N. Y.)
13	Atlantic Chemical Works (Ltd.)	Bayway, N. J. (Elizabeth, N. J.)
14	Atlantic Dyestuff Co	88 Ames Building, Boston, Mass. (Portsmouth, N. H.)
15	Atlas Color Works	322 Ninth Street, Brooklyn, N. Y.
16	Baird & McGuire (Inc.)	Holbrook, Mass.

Directory of manufacturers of coal-tar products during 1921—Continued.

Name of company.	Office address (location of plant given in parentheses if not in same city as office).
Barrett Co., The	40 Rector Street, New York City. (Plants distributed throughout the United States.)
Bayer Co. (Inc.), The	117 Hudson Street, New York City (Rensselaer, N. Y.).
Beaver Chemical Co. (Inc.)	Damascus, Va.
Beaver Manufacturing Co	Ballardvale, Mass.
Brooklyn Color Works (Inc.)	Stewart Avenue and Cherry Street, Brooklyn, N. Y.
Butterworth-Judson Corporation	61 Broadway, New York City. (Newark, N. J.)
Samuel Cabot (Inc.)	141 Milk Street, Boston, Mass. (Chelsea, Mass.)
Calco Chemical Co., The	Bound Brook, N. J.
Carey Manufacturing Co., The Philip	Lockland, Ohio.
Carus Chemical Co	La Salle, Ill.
Central Dyestuff & Chemical Co	Plum Point Lane, Newark, N. J.
Certain-teed Products Corporation	Boatman's Bank Building, St. Louis, Mo. (East St. Louis, Ill.)
Chatfield Manufacturing Co., The	Seventy-fourth and Lebanon Streets, Station P, Cincinnati, Ohio.
Chemical Company of America (Inc.), The	46 Murray Street, New York City. (Springfield, N. J.)
Chester Chemical Corporation	36-40 Delevan Street, Brooklyn, N. Y.
Childs & Co., Charles M	41 Summit Street, Brooklyn, N. Y.
Chris Co., Antoine	147 Waverly Place, New York City. (Delawanna, N. J.)
Cincinnati Chemical Works (Inc.)	Box 20, Evanston Station, Cincinnati, Ohio. (Norwood and St. Bernard, Ohio.)
Citizens Gas Co	Majestic Building, Indianapolis, Ind.
Coleman & Bell	Norwood, Ohio.
Commonwealth Chemical Corporation	15 Park Row, New York City. (Newark, Wayne County, N. Y.)
Commonwealth Color & Chemical Co	Nevins, Butler, and Baltic Streets, Brooklyn, N. Y.
Condensite Co. of America	Bloomfield, N. J. (Wyandotte, Mich.)
Consolidated Color & Chemical Co	122 Hudson Street, New York City. (Newark, N. J.)
Cooks Falls Dye Works (Inc.)	80 Maiden Lane, New York City. (Cooks Falls, N. Y.)
Coopers Creek Chemical Co	West Conshohocken, Pa.
Corona Chemical Division (Pittsburgh Plate Glass Co.)	213-215 Lake Street, Milwaukee, Wis.
Crescent Color & Chemical Works (Inc.)	Fifty-ninth Street and Eleventh Avenue, New York City. (Dunellen, N. J.)
Croton Color & Chemical Co. (Inc.)	263 Broadway, New York City. (Croton-on-Hudson, N. Y.)
Denver Gas & Electric Light Co	900 Fifteenth Street, Denver, Colo.
Dermatological Research Institute (Inc.)	1720 Lombard Street, Philadelphia, Pa.
Deyoe & Raynolds Co. (Inc.)	101 Fulton Street, New York City. (Chicago, Ill.)
Diamenol Co. (Inc.)	904 Ellicott Square, Buffalo, N. Y.
Dicks David Co. (Inc.)	19 North Moore Street, New York City. (Chicago Heights, Ill.)
Dieseway Chemical Co. (Inc.)	55 Eckford Street, Brooklyn, N. Y.
Dow Chemical Co., The	Midland, Mich.
du Pont de Nemours & Co., E. I	1007 Market Street, Wilmington, Del. (Deepwater Point and Lodi, N. J.)
Dynamite Chemical Co. (Inc.)	Box 216, New Brunswick, N. J.
Dye Products & Chemical Co. (Inc.)	200 Fifth Avenue, New York City. (Newark, N. J.)
Dyestuffs & Chemicals (Inc.)	11th and Monroe Streets, St. Louis, Mo.
Eakins (Inc.), J. S. & W. B	24 Wallabout Street, Brooklyn, N. Y.
Eastman Kodak Co	343 State Street, Rochester, N. Y. (Kodak Park Works, Rochester, N. Y.)
Essex Aniline Works (Inc.)	88 Broad Street, Boston, Mass. (South Middleton, Mass.)
Fine Colors Co. (Inc.)	21-29 McBride Avenue, Paterson, N. J.
Pharmasynth Laboratories (Inc.)	Olmstead and Starling Avenues, Unionport, N. Y.
Fries Bros	92 Reade Street, New York City. (Bloomfield, N. J.)
Fries & Fries Co., The	1501 West Sixth Street, Cincinnati, Ohio.
Garfield Aniline Works (Inc.)	Midland Avenue, Garfield, N. J.
Gary Chemical Co	738 Broadway, Gary, Ind. (Chesterton, Ind.)
Garkill Chemical Corporation	157 Spencer Street, Brooklyn, N. Y.
Goodrich Co., The B. F	Akron, Ohio (Akron Mill No. 3).
Grahame Chemical Co	636 East State Street, Trenton, N. J.
Grasselli Chemical Co., The	1300 Guardian Building, Cleveland, Ohio. (Grasselli, N. J., Rensselaer, N. Y.)
Harmer Laboratories Co	Baltimore and Hirst Avenues, East Lansdowne, Pa. (Lansdowne, Pa.)
Helena Light and Railway Co., The	Helena, Mont.
Heller & Merz Co., The	338 Wilson Avenue, Newark, N. J.
Herrmann & Co., Morris	200 Fifth Avenue, New York City. (Newark, N. J.)
Heyden Chemical Co. of America (Inc.)	Garfield, N. J.
Hind & Harrison Plush Co., The	Clark Mills, N. Y.
Hirsch Laboratories (Inc.), The	50 East Forty-first Street, New York City. (Brooklyn, N. Y.)
Holland Aniline Co	Holland, Mich.
Holliday Kemp Co. (Inc.)	Betts Avenue and Queens Boulevard, Woodside, L. I., N. Y. (New York, N. Y.)

Directory of manufacturers of coal-tar products during 1921—Continued.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
79	Hooker Electrochemical Co	25 Pine Street, New York City. (Niagara Falls, N. Y.)
80	Hord Color Products Co., The	1636 Columbus Avenue, Sandusky, Ohio.
81	Hub Dyestuff & Chemical Co	595 East Seventh Street, South Boston, Mass.
82	Hydrocarbon Chemical Co	951 East Orange Street, Lancaster, Pa.
83	Hynson, Westcott & Dunning	Charles and Franklin Streets, Baltimore, Md.
84	Imperial Color Works (Inc.)	Glens Falls, N. Y.
85	Independent Coal Tar Co	26 Broad Street, Boston, Mass. (Taunton, Mass.)
86	Indiana Dye & Chemical Co	One Hundred and Fiftieth Street and Calumet Avenue, Hammond, Ind.
87	International Coal Products Corporation.	295 Fifth Avenue, New York City. (South Clinchfield, Va.)
88	Interstate Products Corporation	Bristol, Tenn.
89	Ising Corporation, The C. E	Flushing, N. Y.
90	Jaenecke-Ault Co	Avenue B and Wright Street, Newark, N. J.
91	Kem-O-Zone Laboratories (Inc.)	375 Ellicott Street, Buffalo, N. Y.
92	Kentucky Color & Chemical Co	Thirty-fourth Street, South of Bank Street, Louisville, Ky.
93	Klipstein & Sons Co., E. C	644 Greenwich Street, New York City. (Chrome, N. J., South Charleston, W. Va., and Edgewater, N. J.)
94	Kohnstamm & Co., H	87 Park Place, New York City. (Brooklyn, N. Y.)
95	La Motte Chemical Products Co	13 West Saratoga Street, Baltimore, Md.
96	Lasher & Co. (Inc.), F. G	104 Grove Street, Brooklyn, N. Y.
97	Lawrence Color & Chemical Works	15 Merrimac Street, Lawrence, Mass.
98	Lee Co., A	Lawrence, Mass. (Methuen, Mass.)
99	Lewis Manufacturing Co., F. J	2513 South Robey Street, Chicago, Ill.
100	Lucas Paint Co., Alston	1031 Currier Street, Chicago, Ill.
101	Lucas & Co. (Inc.), John	322 Race Street, Philadelphia, Pa. (Gibbsboro, Camden Co., N. J.)
102	Mallinckrodt Chemical Works	3600 North Second Street, St. Louis, Mo.
103	Marietta Refining Co., The	Central Bank Building, Marietta, Ohio.
104	Max Marx Color & Chemical Co	192-194 Coit Street, Irvington, N. J.
105	Massachusetts Department of Public Health.	Room 540, State House, Boston, Mass.
106	May Chemical Works	204 Niagara Street, Newark, N. J.
107	Mepham & Co., Geo. S	Twentieth and Lynch Avenues, East St. Louis, Ill.
108	Merck & Co	45 Park Place, New York City. (Rahway, N. J.)
109	Merrimac Chemical Co	148 State Street, Boston, Mass. (North Woburn, Mass.)
110	Metz Laboratories (Inc.) H. A	122 Hudson Street, New York City. (Brooklyn, N. Y.)
111	Monroe Drug Co	Fourth and Oak Streets, Quincy, Ill.
112	Monsanto Chemical Works	1724 South Second Street, St. Louis, Mo.
113	National Ammonia Co. of Penna., The	Delaware Avenue and Van Kirk Street, Philadelphia, Pa.
114	National Aniline & Chemical Co. (Inc.)	40 Rector Street, New York City. (Brooklyn, N. Y.; Buffalo, N. Y.; Marcus Hook, Pa.)
115	Naugatuck Chemical Co., The	Naugatuck, Conn.
116	Newport Co., The	1112 First Wisconsin National Bank Building, Milwaukee, Wis.
117	New England Aniline Works (Inc.)	95 Broad Street, Boston, Mass. (Ashland, Mass.)
118	New Haven Gas Light Co	New Haven, Conn.
119	New York Color & Chemical Co. (Inc.)	Belleville, N. J. (Philadelphia, Pa.)
120	New York Quinine & Chemical Works	135 Williams Street, New York City. (Brooklyn, N. Y.)
121	Niagara Alkali Co	4205 Buffalo Avenue, Niagara Falls, N. Y.
122	Nitro Products Corporation	Nitro, W. Va.
123	Noil Chemical & Color Works (Inc.)	152 West One hundred and eighth Street, New York City.
124	Norvell Chemical Corporation, The	11 Cliff Street, New York City. (Perth Amboy, N. J.)
125	Palatine Aniline & Chemical Corporation.	81 North Water Street, Poughkeepsie, N. Y.
126	Peerless Color Co. (Inc.)	Bound Brook, N. J.
127	Pennsylvania Coal Products Co	Reiber Building, Butler, Pa. (Petrolia, Pa.).
128	Peoples Gas By-Products Corporation.	122 South Michigan Avenue, Chicago, Ill. (Hawthorne, Ill.).
129	Pharma-Chemical Corporation	233 Broadway, New York. (Bayonne, N. J.)
130	Po Ambo Chemical Co. (Inc.)	Matawan, N. J.
131	Powers-Weightman-Rosengarten Co	916 Parrish Street, Philadelphia, Pa.
132	Providence Chemical Laboratories	51 Empire Street, Providence, R. I.
133	Radiant Dye & Color Works	2837 West Twenty-first Street, Brooklyn, N. Y.
134	Raritan Aniline Works	New Brunswick, N. J.
135	Redmanol Chemical Products Co	636 West Twenty-second Street, Chicago, Ill.
136	Reliance Aniline & Chemical Co. (Inc.)	15 William Street, New York City. (Poughkeepsie, N. Y.)
137	Republic Color & Chemical Works	P. O. box 533, Reading, Pa.
138	Republic Creosoting Co	1614 Merchants Bank Building, Indianapolis Ind. (St. Louis Park, Minn.; Seattle, Wash.; Mobile, Ala.)
139	Rhodia Chemical Co	89 Fulton Street, New York City. (New Brunswick, N. J.)
140	Ruxton (Inc.), Philip	220 West Forty-second Street, New York City. (247/253 Water Street, Brooklyn, N. Y.)

Directory of manufacturers of coal-tar products during 1921—Continued.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
141	Sanborn Chemical Works	Putnam, Conn.
142	Secaw Chemical Co	525 Chancellor Avenue, Irvington, N. J.
143	Semet-Solvay Co	Syracuse, N. Y.
144	Seydel Manufacturing Co	78–100 Forrest Street, Jersey City, N. J.
145	Sherwin-Williams Co., The	Cleveland, Ohio. (Kensington, Chicago, Ill.)
146	Siegle Corporation of America, G	Rosebank, S. I., N. Y.
147	Siemon & Elting	93 Nassau Street, New York City. (Irvington, N. J.)
148	Sinclair & Valentine Co	11 St. Clair Place, New York City. (Edgewater, N. J.)
149	Sun Chemical & Color Co	309–321 Sussex Street, Harrison, N. J.
150	Synfleur Scientific Laboratories (Inc.)	Monticello, N. Y.
151	Synthetical Laboratories of Chicago	1326 West Congress Street, Chicago, Ill.
152	T. M. & G. Chemical Co	Belleville, N. J.
153	Tar Products Corporation	913 Turks Head Building, Providence, R. I. (East Providence, R. I.)
154	Texdel Chemical Co. (Inc.)	120 Maiden Lane, New York City. (Jersey City, N. J.)
155	Textile Chemical Co	Public Street and Allen's Avenue, Providence, R. I.
156	Thatcher Process Co. (Inc.)	523 Tracy Street, Syracuse, N. Y.
157	Tower Manufacturing Co. (Inc.)	326 Broadway, New York City. (Newark, N. J.)
158	Trico Chemical Co. (Inc.)	502 Iroquois Building, Buffalo, N. Y.
159	Ullman Co., Sigmund	Park Avenue and One hundred and forth-sixth Street, New York City.
160	Ultro Chemical Corporation	41 Union Square, New York City. (Brooklyn, N. Y.)
161	Uniform Color & Chemical Corporation	Market Street and Bertrand Avenue, Perth Amboy, N. J
162	Van Dyk & Co	4 Platt Street, New York City. (Jersey City, N. J.)
163	Verona Chemical Co	26 Verona Avenue, Newark, N. J.
164	Warner-Jenkinson Co	2526 Baldwin Street, St. Louis, Mo.
165	Western Dry Color Co	Fifty-second and Wallace Streets, Chicago, Ill.
166	White Tar Co. of New Jersey (Inc.), The	56 Vesey Street, New York City. (Kearney, N. J.)
167	Wilbur White Chemical Co., The	Owego, N. Y.
168	Wilhelm Co., The A	Reading, Pa.
169	Will Corporation	845 Maple Street, Rochester, N. Y.
170	Williamsburg Chemical Co. (Inc.)	230 Morgan Avenue, Brooklyn, N. Y.
171	Jacques Wolf Co	Passaic, N. J.
172	Wyoming Dyestuffs & Chemical Corporation.	P. O. box 12, Scranton, Pa.
173	Zinsser & Co	Hastings-on-Hudson, N. Y.
174	Zobel Co. (Inc.), Ernst	Second Avenue and Tenth Street, Brooklyn, N. Y.
175	Stearns & Co., Frederick	Jefferson and Bellevue Avenues, Detroit, Mich.

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OCT 3 1922

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WASHINGTON

Tariff Information Series—No. 26

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1921

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1922

UNITED STATES TARIFF COMMISSION

Office: Eighth and E Streets NW., Washington, D. C.

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INTRODUCTION.

This report is a survey of the domestic dye and organic chemical industry in 1921. It presents the results of a special investigation made by the United States Tariff Commission as to the production in the United States of coal-tar dyes and also of synthetic organic chemicals, both those of coal-tar origin and those derived from other sources. In addition, there is included a detailed census of dye imports. The survey is divided into five parts, as follows:

Part I, a summary of the census of dyes and other synthetic organic chemicals in 1921, describes the progress made in the various branches of the American industry. The relation of the export and import trade to the industry is briefly shown.

Part II, a census of dyes and coal-tar chemicals in 1921, gives a detailed discussion of the significant facts in the production of crude, intermediate, and finished coal-tar products during 1921. The dyes are classified by Schultz number and also by their method of application, and the imports during 1914 (fiscal year) and 1920 and 1921 (calendar years) are compared with the production from 1917 to 1921, inclusive. One-quarter of the production of German dye plants, reserved for the allied and associated Governments from February, 1920, to March, 1922 is tabulated by months, together with details of the export trade of Germany in 1913. The number of employees, rates of pay, and cost of research in the domestic coal-tar chemical industry are given, and also a list of manufacturers whose production during 1921 was reported to the Tariff Commission.

Part III contains dyes imported for consumption in the United States in 1921 (calendar year) and shows the quantity and value of imports of individual dyes and percentage of quantity of each dye by countries of origin.

Part IV, a census of synthetic organic chemicals, other than those derived from coal tar, is included for the first time in a report of the Commission. This shows quantity and value of the production in 1921 with a brief discussion of these products. In addition, there are listed those manufacturers whose production during 1921 was reported to the Tariff Commission.

Part V, an appendix, gives imports and exports of coal-tar dyes and chemicals and of natural dyes during 1921.

In the preparation of this report the Tariff Commission had the services of Warren N. Watson, Dexter North, and C. R. DeLong, of the chemical division, and of others of the commission's staff.

PART I.

SUMMARY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1921.

PART I.

SUMMARY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1921.

INTRODUCTORY.

The United States Tariff Commission has reported annually, beginning with 1917, the progress of the American dye industry. In the 1919 and 1920 reports and in the present report production figures on dyes are supplemented by a detailed census of dye imports. Other reports prepared by the Tariff Commission relating to conditions in the dye industry include (1) Costs of Production in the Dye Industry, 1918 and 1919; and (2) Dyes and Other Coal-Tar Chemicals, December 12, 1918.

The general grouping of coal-tar chemicals adopted in the present 1921 report follows that of the act of September 8, 1916, which conforms in general (although not in every detail) with common practice: Group I, crudes, exempt from duty, are contained in and separated from crude coal tar; Group II, intermediates, dutiable at 15 per cent and 2½ cents per pound, are produced from the crudes by chemical processes and, with some exceptions, are used only for the manufacture of dyes or other finished products by further chemical treatment; and Group III, dyes and other finished products now dutiable in part at 30 per cent and in part at 30 per cent and 5 cents per pound. The term "other finished products" includes color lakes, photographic chemicals, medicinals, flavors, perfume materials, synthetic resins, and synthetic tanning materials. A summary of the production of coal-tar products in 1921 according to the classes given above is shown in Table 1.

The 1921 report is based on the production of 201 firms engaged in the manufacture of coal-tar products, which, it is believed, represents a complete record of the production of dyes and coal-tar chemicals in the United States. The quantity and value of the domestic production of each product and the analysis of these figures are given in as great detail as possible without revealing the operations of individual manufacturers. A detailed census of dyes imported for consumption during the calendar year 1921 is given as to quantity, invoice value, and countries of origin. An analysis is given of the export trade in dyes, by months, from July, 1917, to March, 1922, inclusive. This report also contains the one-quarter production in German dye plants reserved for the purchase of allied and associated Governments, by months, from February, 1920, to March, 1922, with a comparison of the present output with that of 1914, and also data on Germany's export trade, by countries, in coal-tar dyes in 1914.

Summary of Domestic Production, 1921.

CRUDES.

The Tariff Commission pointed out in its Census of Dyes and Coal-Tar Chemicals, 1920, that the output of coal tar by the American coke ovens was sufficient to meet demands in the coal-tar chemical industry for crude materials. A significant feature of the 1921 coke-oven output was that 78 per cent of the total was by-product coke, compared with 60 per cent for 1920. This continued increase in the proportion of by-product coke insures an adequate supply of coal tar for separation by distillation into crude coal-tar products, which are the basis of the intermediate and finished products. The total output of by-product and beehive coke in 1921 was 25,479,000 tons, a decrease of 5,429,000 tons from that of 1920.

The production of crudes at the by-product ovens during 1921 reported to the United States Geological Survey is not yet available for publication. The output of crudes by firms primarily engaged in tar distillation was reported to the Tariff Commission. The production of benzene by those firms in 1921 showed a large increase. There were also substantial increases in the output of carbazole, cresol, and pyridine. There was a large decrease in the output of naphthalene and anthracene by the tar distillers. The production of anthracene, due to the domestic soft-pitch requirements, has not been adequate in any year to produce sufficient anthraquinone for the preparation of vat and alizarin dyes consumed in the United States. The commercial production of anthraquinone from phthalic acid and benzene indicates, however, that this important intermediate can be obtained in quantity from this source, thus supplementing the inadequate supply of anthraquinone manufactured from anthracene. The production of crudes is given in detail in Part II of this report.

INTERMEDIATES.

The total production of intermediates in 1921 by 108 different manufacturers was 70,899,912 pounds, a decrease of 73 per cent in quantity from the 1920 output. The total sales during 1921 were 33,637,326 pounds, valued at $8,483,463. The average price per pound of all intermediates sold in 1921 was 25 cents per pound compared with a price of 37 cents per pound for the total production of intermediates in the previous year.

The number of intermediates reported in 1921 was 233 compared with 236 in 1920. Of the total number reported in 1921, 49 were reported for the first time. Some of these new products are of special importance in considering the progress of the industry, as they are required in the production of the more complex and faster types of dyes and represent a significant development in the industry. Several of these new intermediates are used directly in the production of dyes upon the fiber and have heretofore been imported. The large decrease in the 1921 production of intermediates may be attributed to several causes: (1) The loss of most of our export trade in dyes, (2) the large stocks carried over from the previous year, and (3) a general business depression. There has been a general decline in output of intermediates since 1918, due to the fact that at

that time a large part of the intermediates were consumed for munitions, poison gases, and for special dyes required in large quantities for dyeing military cloths.

In general, the intermediates used in producing those dyes consumed in the largest quantity show large reductions. There were, however, notable increases in certain intermediates of the more specialized types, and the tendency during 1921 was toward the production of intermediates which more nearly represent normal domestic requirements.

During 1921 the export trade in dyes was greatly reduced as compared with 1920; hence the intermediates produced in 1921 were used in the manufacture of dyes which more nearly represent the needs for consumption of the domestic textile industry. In addition to the requirements of the domestic dye manufacturer, these intermediates are also used in the production of photographic chemicals, medicinals, flavors, perfume materials, synthetic phenolic resins, and synthetic tanning materials. There are still a few intermediates for which production is not yet reported, or reported only in small amounts, which should be added to the domestic manufacturing program in order to give a complete line of dyes of domestic manufacture.

The production of coal-tar chemicals used for research and experimental purposes totaled 2,012 pounds in 1921, compared with 1,852 pounds for the previous year. Total sales of these products amounted to 901 pounds, valued at $18,334. These products are essential for both technical and scientific research and are a necessary adjunct to the development of the domestic coal-tar chemical industry.

DYES.

Production.—The domestic output of dyes in 1921 by 74 manufacturers totaled 39,008,690 pounds, a decrease of 56 per cent from that of 1920. The sales during 1921 totaled 47,513,762 pounds, with a value of $39,283,956. The sales exceeded the production by 22 per cent, indicating that a part of the domestic consumption for that year was supplied from stocks carried over from the previous year's abnormal production. The average sales prices of dyes for 1921 was 83 cents per pound, compared with $1.08 for 1920 and $1.26 for 1917. The greatly reduced output of 1921, as was stated under "Intermediates," may be accounted for by (1) loss of the most of our export trade, (2) the large stocks carried over from the previous year, and (3) the business depression.

The progress of the year includes the manufacture for the first time in this country of a large number of dyes of greater complexity and more specialized application. The development of these products is a highly technical achievement and a creditable advancement of the industry. Dyes of each class (according to application) were among the new products manufactured in 1921, and a considerable number of these new colors were among the more important not heretofore made in the United States. This progress has continued, as production of many new dyes has been reported during the first five months of 1922. The domestic dye industry is still deficient, however, in the manufacture of vat dyes, alizarins, and certain special types.

The production of dyes in 1921, grouped by classes according to method of application, was as follows: Acid dyes, 7,843,009 pounds, or 20.11 per cent of the total production; basic dyes, 1,853,094 pounds, or 4.7 per cent; direct cotton dyes, 7,053,761 pounds, or 18.08 per cent; sulfur dyes, 10,239,255 pounds, or 26.25 per cent; vat dyes, including indigo, 7,019,120 pounds, or 17.99 per cent, the vat colors being divided into: Indigo, 6,673,968 pounds, and other vats, 345,152 pounds; mordant and chrome colors, 3,997,442 pounds, or 10.25 per cent; lake and spirit-soluble dyes, 720,406 pounds, or 1.85 per cent; unclassified dyes, 282,603 pounds, or 0.72 per cent.

Imports.—The total importation of coal-tar dyes during the calendar year 1921 was 3,914,036 pounds, valued at $5,156,779, compared with 3,402,582 pounds, valued at $5,763,437, during the calendar year 1920. Reducing the vat dyes to a single strength basis, the total quantity of dyes imported in 1921 was 4,252,911 pounds. Germany supplied 48.34 per cent of the total dyes imported during 1921; 40.53 per cent came from Switzerland, 7.34 per cent originated in England, while Italy supplied 2.7 per cent, these imports largely representing re-exported reparation dyes of German manufacture. Holland supplied 0.45 per cent, probably nearly all of German origin; France, 0.37 per cent. The imports of dyes from all other countries totaled 0.27 per cent.

The imports of dyes in 1921 are equal to 10 per cent of the quantity produced during that year, and 8.5 per cent of the total imports during 1914, when the United States imported 45,950,895 pounds of dyes and produced 6,619,729 pounds from imported intermediates. The dyes imported during 1921 include those products which are either not yet manufactured in this country, or are not yet produced in an adequate quantity or in a satisfactory quality to meet all special requirements.

Table 24 shows the quantity and value of each individual dye imported during the calendar year 1921 and also the percentage of each by the country of origin.

Exports.—The Commerce Department reports exports of domestic "dyes and dyestuffs" under (1) "aniline dyes"; (2) "logwood extract"; (3) "all other dyes and dyestuffs," and only the value of these groups is given. In 1922, however, a new classification was adopted which divided coal-tar dyes into (1) "color lakes," and (2) "other colors, dyes, and stains."

The combined value of exports of "aniline dyes" and "all other dyes" for 1921 was $6,270,155 compared with $29,823,591 for 1920, and $15,728,499 for 1919. In other words, exports of domestic dyes for 1921 showed a decrease of 79 per cent as compared with the previous year. The total exports during 1917, one of the early years when the domestic industry was first expanding from its small pre-war size, were valued at $7,548,963, which is greater than the 1921 exports.

The combined value of exports of coal-tar "color lakes" and "other colors, dyes, and stains" for the first three months in 1922 was $973,316 compared with $2,432,764 for "aniline dyes" and "all other dyes and dyestuffs" for the first three months of the previous year. In quantity, the exports during the first three months of 1922 totaled 1,387,594 pounds. This great reduction in our export trade may be attributed in part to the general business depression, but the chief

cause was the appearance in the principal foreign markets, such as China, India, and Japan, of German dyes, with which the domestic producers have been unable to compete. As far back as 1919 the Tariff Commission pointed out in its Census of Dyes and Coal-Tar Chemicals for that year that any deductions as to the competitive strength of the domestic industry based on the large exports of 1919 and 1920 were not warranted, as the domestic producers during that period met little competition in foreign markets from German colors. Subsequent developments have borne out the accuracy of that statement, as indicated by the rapid decline in exports during 1921 and 1922.

OTHER FINISHED COAL-TAR PRODUCTS.

Color lakes.—The total output by 43 firms of this class of pigments was 6,152,187 pounds compared with 10,983,538 pounds, valued at $5,871,820 in 1920. Total sales of color lakes for 1921 amounted to 6,424,612 pounds, valued at $2,863,189.

Photographic chemicals.—The production by five firms of those coal-tar chemicals used as photographic developers totaled in 1921 183,798 pounds, compared with 440,759 pounds in 1920. Sales during 1921 amounted to 170,221 pounds, valued at $248,041.

Medicinals.—This class of coal-tar products, made by 34 firms, may be considered one of the most important, as they are essential to the Nation's welfare. The highest technical and research skill is required in the development and commercial production of these chemicals. During 1921 conspicuous progress was made in the development of synthetic medicinals of coal-tar origin. The total production for 1921 was 1,545,917 pounds, including a small quantity of disinfectants, the sales amounting to 1,876,246 pounds, valued at $2,930,324. The 1920 production, including a considerable quantity of disinfectants, was 5,184,989 pounds, valued at $5,726,776. Total production figures for 1920 and 1921 are, however, not strictly comparable, on account of the large quantity of disinfectants of a relatively low value reported in 1920 and the small quantity of this group reported in 1921.

Perfumes and flavors.—These coal-tar products are closely related and certain members of this class are used both as flavors and perfumes. The total output of flavors by 17 firms in 1921 was 901,245 pounds, compared with 166,884 pounds in 1920. Sales for 1921 amounted to 933,662 pounds, valued at $1,002,018. The production of perfumes by 15 firms in 1921 was 119,335 pounds, compared with 99,740 pounds for the previous year. Sales in 1921 amounted to 119,691 pounds, valued at $175,815.

Synthetic phenolic resins.—These products are used as substitutes for amber in making pipestems and similar articles, electrical insulators, varnishes, and lacquers. The 1921 production by three firms was 1,643,796 pounds, compared with a production of 4,659,680 pounds during the previous year. Sales in 1921 amounted to 1,674,456 pounds, valued at $1,352,166.

Synthetic tanning materials.—The output of these products by four firms amounted to 1,902,597 pounds in 1921, compared with 3,142,861 pounds in 1920. The sales were 1,721,359 pounds, valued at $141,005 during 1921.

TABLE 1.—*Summary of the production of dyes and coal-tar chemicals, 1918 to 1921, inclusive.*

	1918			1919		
	Number of manufacturers.	Production.		Number of manufacturers.	Production.	
		Quantity.	Value.		Quantity.	Value.
		Pounds.			*Pounds.*	
Group II—Intermediates	128	357,662,251	$124,382,892	116	177,362,426	$63,210,079
Group III:						
Finished products		76,802,959	83,815,746	155	82,532,390	84,585,544
Dyes	78	58,464,446	62,026,390	90	63,402,194	67,598,855
Color lakes	29	9,590,537	5,020,023	34	7,569,921	4,179,964
Photographic chemicals	6	316,749	823,915	10	335,509	1,059,340
Medicinals	31	3,623,352	7,792,984	31	6,777,988	7,883,071
Flavors	7	458,256	4,925,627	9	610,825	1,318,634
Perfumes	6	116,263	584,695	6	41,419	164,302
Tanning materials	1	4,233,356	2,642,120	1	3,794,534	2,381,358
Synthetic phenolic resins	5			5		

	1920			1921			
	Number of manufacturers.	Production.		Number of manufacturers.	Production.	Sales.	
		Quantity.	Value.		Quantity.	Quantity.	Value.
		Pounds.			*Pounds.*	*Pounds.*	
Group II—Intermediates	119	257,726,911	$95,291,686	108	70,899,912	33,637,326	$8,483,463
Group III:							
Finished products	161	112,942,227	112,731,547	147	51,457,565	60,434,009	47,906,514
Dyes	82	88,263,776	95,613,749	74	39,008,600	47,513,762	39,283,936
Color lakes	43	10,983,538	5,871,820	43	6,152,187	6,424,612	2,863,189
Photographic chemicals	8	440,759	1,015,848	5	183,798	170,221	248,041
Medicinals	35	5,184,989	5,726,776	34	1,545,917	1,876,246	2,930,324
Flavors	15	166,884	527,493	17	901,245	933,662	1,002,618
Perfumes	12	99,740	332,008	15	119,335	119,691	175,815
Tanning materials	4	3,142,861	233,674	4	1,902,597	1,721,359	141,009
Synthetic phenolic resins	4	4,659,680	3,410,179	3	1,643,796	1,674,456	1,352,166

SYNTHETIC ORGANIC CHEMICALS, OTHER THAN THOSE DERIVED FROM COAL TAR.

For the first time the Tariff Commission has undertaken the compilation of a census of chemicals other than those derived from coal tar or directly from natural sources. These included acids, alcohols, esters, ketones, aldehydes, derivatives of alkaloids, carbocyclic compounds, etc., which are used as perfume and flavoring ingredients, solvents, medicinals, and in numerous industrial processes.

The production of these synthetic organic chemicals during 1921 was 21,545,186 pounds, and the sales amounted to 16,761,096 pounds, valued at $13,746,235, at a unit value of $0.82 per pound. In this production 1,129 pounds of research chemicals are included, and in the sales 428 pounds, which totaled $7,715 or $18.02 per pound.

Without any previous census of this character, no comparisons can be made regarding the actual growth and progress of these industries, but this compilation is of value because it shows for the first time the quantity, value, and number of such synthetic organic chemicals produced or sold in the United States in a given year. Subsequent reports will reveal more definitive conclusions as to the existing conditions. In conclusion it should be added that the manufacture of most of the products enumerated has been developed in this country during or since the war era.

PART II.

PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1921.

Part II.

PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1921.

Coal-Tar Crudes.

Description.—In the manufacture of coke in by-product ovens and in the production of coal gas for city lighting and heating one of the by-products is coal tar, which yields by distillation or other simple methods of treatment (sublimation and washing with acids and alkalies) a class of substances known as coal-tar crudes. The most important crudes are benzene, toluene, naphthalene, and anthracene. Other crudes include xylene, cumene, carbazole, the cresols, and pyridine. These products, after purification, are used in the preparation of coal-tar intermediates. The latter, in turn, are used in the manufacture of dyes and other finished products included in this census. In addition to the crudes, certain pitches are included in this report which are used for road making, roofing, prepared roll roofing and shingles, tar felt, building paper, and such other minor uses as sealing dry batteries, and for fuel. There also appear in commerce, mixtures obtained from coal tar by distillation, under the names of solvent naphtha, light oil, dead oil, creosote oil, anthracene oil, and pitch. Solvent naphtha is used mainly as a solvent for paint, rubber, cements, and other materials. Certain of the lighter distillates containing benzene, toluene, and xylene are used in the preparation of blended motor fuels and serve in these cases as substitutes for gasoline. Creosote oil is used on a large scale for the preservation of wood (telegraph poles, fence posts, railroad ties, and paving blocks) and also for animal dips.

By-product coke ovens continue to replace beehive type.—In 1921 the combined output of by-product and beehive coke, as reported by the United States Geological Survey, was 25,479,000 tons, divided as follows: by-product coke, 19,918,000 tons; beehive coke, 5,561,000 tons. The combined coke output for 1920 was 30,908,000 tons. During 1920, 60 per cent of the coke was produced from by-product coke ovens compared with 78 per cent in 1921. The output of beehive coke in 1921 was less than that for any year since 1885. No new beehive ovens were constructed in 1920 and more than 6,700 were abandoned. On January 1, 1921, there were in existence 10,881 by-product ovens with a daily capacity of 117,319 tons. The beehive ovens on that date totaled 75,298, with a daily capacity of 196,065 tons of coke. Of the ovens under construction, 396 were by-product and 332 were of the beehive type.

This continued replacement of beehive ovens with by-product ovens, which recover the tar, ammonia, and gas products entirely wasted by the old beehive type, is of economic significance in the conservation of our resources, for (1) the by-product ovens increase production of ammonia for fertilizer and other uses; (2) the gas produced in these ovens is used for municipal lighting or industrial

heating; (3) the output of tar insures an abundant supply of coal tar for the preparation of crudes, which serve as the basis of the domestic coal-tar dye and chemical industry.

Output of coal-tar crudes.—The domestic production of crudes is collected either by the Tariff Commission or the Geological Survey, according to the producers. The crudes produced by the distillation of tar at by-product coke ovens are reported to the United States Geological Survey. The output from this source for 1919–20 and the estimated production for 1921 are given in Table 2. The production of crudes by firms engaged primarily in the distillation of coal tar is reported to the United States Tariff Commission, and is shown in Table 3. The figures from both sources must be considered in arriving at the total output for a given year. The two tables referred to, however, do not include the production of crudes at coal-gas, water-gas, and oil-gas plants. Data for the production in these plants are being compiled by the United States Geological Survey, but are not yet available for publication. The output from this source, however, constitutes only a small percentage of the total crudes produced.

The estimated tar production from coke-oven operations for 1921, reported by the United States Geological Survey, was 233,000,000 gallons, compared with an actual output in 1920 of 360,664,124 gallons, with total sales of 174,363,696 gallons, valued at $6,378,040. This table of the Geological Survey does not contain estimates for the output of individual crudes produced during 1921 at the by-product coke-oven plants.

Table 3 contains the output of crudes reported to the United States Tariff Commission by firms not primarily engaged in the operation of coke-oven plants and gas houses. There was a large increase in the output of benzene during 1921 compared with the previous year and also a substantial increase in the output of carbazole, cresol, and pyridine. In 1921 the output of benzene was 2,171,631 pounds, a 148 per cent increase over the previous year. The output of toluene and xylene both decreased; the figures, however, can not be published. The naphthalene output for 1921 was 16,949,464 pounds, a 36 per cent decrease compared with the previous year. The output of anthracene (25 per cent purity) totaled 1,604,717 pounds, a decrease of 43 per cent compared with the previous year. During 1919 and 1920 a serious shortage of naphthalene occurred, which resulted in a considerable importation during those two years. This shortage was due to miscalculation on the part of the producers, who believed that the stocks on hand were sufficient to meet the normal future demands. Later the large export trade in dyes during 1920 resulted in excessive consumption of naphthalene, which necessitated importation to supply the domestic requirement. During the latter part of 1920 the naphthalene production was increased and by 1921 it more nearly met the domestic requirements. The small shortage which still existed was met by importation.

Three years ago the securing of an adequate supply of anthracene for the manufacture of vat and alizarin dyes was one of the most important unsolved problems of the domestic dye industry. The present production of anthracene from coal tar is not adequate to produce all dyes of these classes consumed by the domestic textile industry. The commercial production of synthetic anthraquinone *in 1920, however,* indicates that as fast as the requirements of the

kers increase the supply of anthracene from coal tar and of tic anthraquinone (from phthalic anhydride and benzene) will heir demands. Imports of these products are discussed under mediates."

2.—*By-products obtained from coke-oven operations in 1919, 1920, and 1921.*

[Mineral Resources—United States Geological Survey.]

Product.	Unit.	1919			
		Production.	Sales.		
		Quantity.	Quantity.	Value.	Average unit value.
.....	Gallons.....	288,898,764	217,980,143	$6,919,265	$0.032
te.....	Pounds.....	544,231,985	557,619,631	21,075,718	.038
rous, or free ammonia.....	Pounds, NH_3...	50,535,639	51,646,744	[1] 5,692,950	.110
te equivalent.....	Pounds.....	.....	.....	.....	.....
uted through city mains....	1,000 cubic feet..	.....	5,238,486	2,106,806	.040
steel or affiliated plant....	.....do.....	.....	.....	.....	.....
nder boilers.....	.....do.....	.....	.....	.....	.....
rial purposes.....	.....do.....	.....	138,179,761	8,015,877	.058
service corporation.....	.....do.....	.....	49,655,732	6,562,324	.132
nd derivatives:					
light oil.....	Gallons.....	92,356,750	.....	.....	.....
—					
ide.....	.....do.....	44,060,970	44,697,615	7,776,669	.174
fined.....	.....do.....	17,006,532	18,403,909	3,783,552	.206
fuel.....	.....do.....	(2)	.....	.....	.....
—					
ide.....	.....do.....	.....	.....	.....	.....
fined.....	.....do.....	1,160,136	1,353,827	355,990	.263
t naphtha.....	.....do.....	3,915,489	3,625,978	552,853	.152
refined oils.....	.....do.....	575,885	127,483	18,358	.144
thalene—					
ide.....	Pounds.....	3,549,998	4,038,456	82,244	.020
fined.....	.....do.....	2,763,271	2,663,585	109,120	.041
ducts sold.....	.....	.....	.....	645,142	.....
l value of sales.....	.....	.....	.....	63,696,868	.....

roduct.	Unit.	1920 [3]				1921
		Production.	Sales.			Estimated production.[4]
		Quantity.	Quantity.	Value.	Average unit value.	
.....	Gallons.....	360,664,124	174,363,696	$6,378,040	$0.037	233,000,000
te.....	Pounds.....	675,816,486	626,013,975	27,110,260	.043	.....
rous, or free onia.	Pounds, NH_3...	65,777,259	62,076,772	[5] 8,585,173	.138	.....
te equivalent...	Pounds.....	938,925,522	874,321,063	35,695,433	.041	607,000,000
ated through mains.	1,000 cubic feet..	476,485,744	53,220,824	15,716,888	.295	308,000,000
steel or affili- plant.	.....do.....		151,764,807	14,301,095	.094	
under boilers,	.....do.....		25,430,288	2,216,335	.087	
				32,234,318	.140	.....
rial purposes...	.....do.....	.....	.....	.....	.....	.....
service corpo- n.	.....do.....	.....	.....	.....	.....	.....

anhydrus ammonia reported as such—and ammonia liquor converted to equivalent.
d in crude benzol.
tice, United States Geological Survey.
ed by assuming that the quantity of the several by-products obtained bore the same relation n production of coke in 1921 as in 1920. The recoveries per ton of coal charged in 1920 were as mmonia (sulphate or equivalent), 21.4 pounds; tar, 8.2 gallons; crude light oil, 2.7 gallons; gas e feet.
ammoniacal liquor, reported in content of NH_3.

TABLE 2.—*By-products obtained from coke-oven operations in 1919, 1920, and 1921*—Continued.

Product.	Unit.	1920				1921
		Production.	Sales.			
		Quantity.	Quantity.	Value.	Average unit value.	Estimated production.
Light oil and derivatives:						
Crude light oil	Gallons	109,709,915	1,067,045	[6] $126,158	$0.118	71,000,000
Benzol—						
Crude	do	8,747,572	1,510,420	401,296	.266	
Refined	do	16,977,556	15,720,356	4,096,527	.260	
Motor fuel	do	57,645,462	55,764,265	[7] 12,644,931	.227	
Toluol—						
Crude	do	287,142				
Refined	do	2,710,649	2,470,364	740,722	.300	
Solvent naphtha	do	5,678,525	4,695,464	851,048	.181	
Other refined oils	do					
Naphthalene—						
Crude	Pounds	11,246,807	11,507,703	307,999	.027	
Refined	do	2,921,282	2,941,059	179,975	.061	
				19,348,656		
Other products sold				[8] 36,317		
Total value of sales				[9] 93,692,764		

[6] The quantity of crude light oil refined by the producer amounted to 106,564,417 gallons.
[7] The benzol content of motor fuel ranged from 50 to 100 per cent.
[8] Includes coal-tar oil, crude heavy solvent, carbon, and pyridin oil.
[9] Exclusive of coke breeze, of which 2,460,835 tons was produced and 553,019 tons was sold at a value of $1,249,004.

TABLE 3.—*Production of coal-tar crudes during 1921, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers given on page 79. An X indicates that the corresponding product was made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there was actual production of the corresponding article, but that the figures can not be published without revealing the output of individual firms.]

Name.	Manufacturers' identification number (according to list on page 79).	1921		
		Quantity.	Value.	Value per unit.
Total crudes [1]			$17,936,160	
Benzene, gallons	17, 23, 35, 42, 118, 128, X	2,171,631	463,205	$0.21
Toluene, do	17, 35, 128			
Xylene, do	17			
Naphthalene, crude, pounds	13, 17, 29, 35, 42, 46, 87, 99, 118, 138, 145, 153, X, X, X.	16,949,464	380,167	.02
Anthracene, 25 per cent pure, do	17, 138, 145, X, X	1,604,717	83,707	.05
Carbazole, crude, 60 per cent, do	138			
Cresol, gallons	17, 138, X			
Pyridine, do	17, 113			
Solvent naphtha, do	13, 17, 35, 42, 87, 128, 145, X	649,094	111,286	.17
Dead or creosote oil, do	13, 17, 23, 28, 29, 42, 46, 71, 85, 99, 118, 138, 145, 153, 166, X, X, X, X, X.	28,864,156	3,188,867	.11
Anthracene oil, do	138, 145, X, X	2,857,391	519,347	.18
Pitch of tar, tons	13, 17, 23, 28, 29, 42, 46, 71, 85, 99, 118, 138, 145, 153, 160, 174, X.	347,011	6,514,200	18.77
Other distillates, gallons	13, 17, 23, 28, 42, 46, 85, 87, 99, 138, 153, X.	6,562,332	1,209,291	.18
Refined tars, barrels	13, 17, 23, 46, 71, 85, 99, 118, 138, 145, 153, X, X, X.	1,029,282	5,196,427	5.05

[1] The instructions sent to manufacturers were as follows:
Include under "dead or creosote oil" only products which may be used for creosoting.
Include under "other distillates" shingle-stain oils, disinfectant oils, and flotation oils which do not contain over 5 per cent phenol. Include under "refined tars" those tars which are used for road treatment, saturating felt, and for protective coatings. Phenol and all distillates which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate are not to be included here, but are to be placed in Group II.
Cresol, for the purpose of this report, is defined as a distillate containing more than 5 per cent of phenol and at least 50 per cent of the isomeric cresols.

TABLE 4.—*Comparison of production of coal-tar crudes, 1920 and 1921, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

Name.	1921			1920		
	Quantity.	Value.	Value per unit.	Quantity.	Value.	Value per unit.
Total crudes		$17,936,160			$21,163,937	
Benzene.....gallons..	2,171,631	463,205	$0.21	875,561	287,586	$0.33
Naphthalene, crude.....pounds..	16,949,464	380,167	.02	26,393,411	791,403	.03
Anthracene, 25 per cent pure..do....	1,604,717	83,707	.05	2,829,500	114,661	.04
Solvent naphtha.....gallons..	649,694	111,286	.17	472,000	74,669	.16
Dead or creosote oil.....do....	28,864,156	3,188,867	.11	37,557,245	4,395,290	.12
Anthracene oil.....do....	2,857,391	519,347	.18	3,284,102	593,839	.18
Pitch of tar.....tons..	347,011	6,514,200	18.77	342,401	5,245,554	15.32
Other distillates.....gallons..	6,562,332	1,209,291	.18	8,052,242	1,577,727	.20
Refined tar.....barrels..	1,029,282	5,196,427	5.05	1,386,056	7,582,553	5.47

INTERMEDIATES.

Description.—This class of coal-tar chemicals does not occur as such in the tar, but is prepared from the crudes (benzene, toluene, naphthalene, and anthracene) by chemical treatment, such as with sulfuric acid, nitric acid, alkalies, chlorine, or other chemicals. From less than 10 coal-tar crudes there are prepared from 200 to 300 intermediates required in the production of hundreds of dyes. The various chemical steps required in the conversion of crudes to intermediates are (1) nitration; (2) reduction; (3) sulfonation; (4) caustic fusion; (5) chlorination; (6) alkylation; (7) liming; (8) condensation; (9) carboxylation; (10) oxidation; and (11) dizaotization.

Intermediates are the raw materials which, by the above complex chemical processes are converted into dyes, medicinals, perfumes, flavors, photographic chemicals, and synthetic resins and tanning materials. They are also used to accelerate the vulcanization of rubber, as camphor substitutes, in the direct production of dyes on the fiber, and for increasing the fastness of dyed colors, in which case they are known as "developers." After purification, many intermediates are used directly as drugs, perfumes, and flavors.

Production.—The production of intermediates in the United States during 1920 is shown in Table 5, in as great detail as possible without revealing the output of individual manufacturers. The total output in 1921 was 70,899,912 pounds. The sales during the same year amounted to 33,637,326 pounds, valued at $8,483,463. The production in 1921 represents a 72 per cent decrease from that in 1920. This large reduction in output may be attributed to (1) the loss of export trade in dyes; (2) large stocks carried over from the previous year; and (3) the general business depression.

The number of intermediates reported in 1921 was 233 compared with 236 in 1920. Of the total number reported in 1921, 49 were reported for the first time. The new products are of special importance in considering the progress of the industry, as they are required in the manufacture of the more complex and faster types of dyes. The development and commercial production of many of these intermediates require the highest technical skill.

The manufacture of certain dyes, mostly of the vat and alizarin class, which are now produced in this country either in small amounts

or not at all, would require a greatly increased output of certain intermediates (for example, anthraquinone derivatives) and the initial production of others. While in many cases these dyes are consumed in relatively small quantities by our textile industry, they are nevertheless essential for the dyeing and printing of a variety of textile fabrics.

It should be borne in mind that the 1921 production figures of intermediates do not take into account the stocks which were carried over from the previous year and which were consumed in the preparation of dyes in 1921. The sale of intermediates in the United States represents a relatively small part of the consumption on account of the fact that a large number of the manufacturers of dyes make their own intermediates.

Reduced output of fundamental intermediates.—The most conspicuous change in the 1921 output of intermediates compared with that of the previous year was the large general decrease in most products, with a marked decrease in those intermediates which are required in the largest quantities for the manufacture of dyes. A few intermediates, representing new developments, showed a considerable increase in production during 1921. The following include the more important intermediates used in the preparation of the dyes which represent the bulk of production in the United States; the percentages show the decrease in the 1921 output from that of 1920:

	Per cent.
Aniline oil	86
Benzidine (base and salt)	85
Gamma acid (2-amino-8-naphthol-6-sulfonic acid)	48
H acid (1-amino-8-naphthol-3:6-disulfonic acid)	68
a-Naphthylamine (also used in ore flotation)	92
b-Naphthol, technical	75
p-Nitroaniline	61

Benzene derivatives.—Aniline oil, prepared from benzene, is the most important of all finished intermediates. It is used in the manufacture of dyes of every class, based on method of application and in most classes based on chemical constitution. Among the dyes produced in large amounts which require aniline in their production are Indigo, Direct Black E W, Agalma Black 10 B, Induline, and Nigrosine. The production of aniline oil in 1921 was 5,639,234 pounds; the value and quantity of sales were, next to naphthalene, the highest of any intermediate and totaled 5,259,598 pounds valued at $1,161,381. The production in 1920 was 39,234,186 pounds. The production of aniline salt (aniline hydrochloride and aniline sulfate) showed a large decrease from the output of 2,024,956 pounds for the previous year. A large part of the aniline hydrochloride sold is consumed by the cotton dyer in the direct production of "aniline black" on the fiber.

Dimethylaniline, a derivative prepared from aniline by treatment with methyl alcohol, is used in the manufacture of such important basic dyes as Methyl Violet, Methylene Blue B, and Malachite Green. The output of this intermediate decreased from 5,447,107 pounds valued at $3,857,631 in 1920, to 566,286 pounds in 1921. Total sales in 1921 were 390,931 pounds, valued at $210,910. The output of diethylaniline, used in the manufacture of certain more expensive dyes, such as Brilliant Green, Acid Violet, and Patent Blue, was 32,812 pounds in 1921, an 82 per cent decrease from that of the

previous year. The production of ethylbenzylaniline in 1921 was 16,949 pounds.

Acetanilide (technical) is used as an intermediate, a medicinal (when purified), a stabilizer for hydrogen peroxide, and an ingredient in cellulose ester dopes and lacquers. The output in 1921 was 1,152,713 pounds, compared with 2,667,252 pounds in 1920.

Benzidine, prepared by reduction of nitrobenzene (oil of myrbane) is one of the most important intermediates used in the production of the substantive or direct cotton dyes. The combined production in 1921 of benzidine (base and sulfate) was 328,577 pounds, a decrease of 85 per cent from that of the previous year. The sales during 1921 totaled 277,388 pounds, valued at $235,076. The output of dianisidine, used also in the preparation of direct cotton dyes, showed a large decrease from that of 1920.

In 1921 the sales of phenol (carbolic acid) totaled 292,645 pounds valued at $41,617. Phenol is used both in the manufacture of dyes and other intermediates, such as salicylic acid, and also for synthetic resins and medicinals. The production of salicylic acid U. S. P. (the grade meeting the specifications of the United States Pharmacopœia) was 1,722,575 pounds in 1921, compared with 2,663,494 pounds in 1920. Sales for 1921 totaled 1,185,062 pounds valued at $279,072. The technical grade of salicylic acid is used in large amounts for the preparation of certain mordant and direct cotton dyes. The output of this grade in 1921 was 1,777,752 pounds and the sales amounted to 131,532 pounds, valued at $25,725.

The output of p-nitroaniline, an important intermediate used in the preparation of "para red", both on cotton fiber and for color lakes, and also in the manufacture of Diamine Green B and G, Alizarine Yellow R, and certain sulfur dyes, decreased from 2,138,492 pounds in 1920 to 832,438 pounds in 1921, the sales in the latter year being 621,559 pounds, valued at $526,403. Phenylhydrazine p-sulfonic acid, used in the preparation of the yellow acid dye, Tartrazine, showed a large decrease. The output of o-nitroanisole and of the nitrochlorobenzenes showed marked decreases compared with the previous year.

Triphenyl phosphate, a product used as a substitute for camphor in pyroxylin plastics, first reported in 1920, showed a large decrease in output in 1921. There was, however, a considerable output of tricresylphosphate, which is used for the same purpose.

Of the aniline derivatives used chiefly as accelerators in the vulcanization of rubber, thiocarbanilide decreased from 2,226,807 pounds in 1920 to 1,185,462 pounds in 1921. The sales in the latter year were 376,368 pounds, valued at $157,046. Triphenyl guanidine, a new accelerator of great promise, showed a large increased output in 1921 over the previous year. Considerable quantities of formanilide and anilidothiazol products were reported for the first time.

Toluene derivatives.—The toluidines, used in the preparation of magenta, safranine, the primulines and indamines, showed a large decrease in production during 1921. The output of o-toluidine in 1921 was 208,505 pounds, a decrease of 84 per cent, while p-toluidine totaled 268,629 pounds, a decrease of 70 per cent.

Tolidine and salts, used in the manufacture of direct cotton dyes (mostly reds and blues), showed a large decrease in output in 1921.

The output of benzoic acid, U.S.P., in 1921 totaled 190,483 pounds, the sales amounting to 29,734 pounds valued at $18,432. The output of the technical grade reported for 1921 was only a small fraction of the U.S.P. grade. The combined output of U.S.P. and technical benzoic acid for 1920 was 743,113 pounds. Benzoate of soda, used largely as a food preservative, showed a reduction in output of 53 per cent; the production in 1921 was 381,154 pounds. The price receded from 79 cents per pound in 1920 to 57 cents per pound in 1921. The sales for 1921 (413,595 pounds, valued at $236,784) exceeded the production.

Production of p-nitrotoluene-o-sulfonic acid showed a large increase in 1921, totaling 321,264 pounds. This intermediate is used in the manufacture of Direct Yellow R and other yellows of the stilbene class. Another toluene derivative, m-nitro-p-toluidine, which is sold to the textile trade under the name of Fast Red G base for the production of a fast red on cotton, showed a production of 70,094 pounds. Production was also reported for p-nitro-o-toluidine, which is sold for similar purposes under the name of Fast Scarlet G base.

Xylene derivatives.—The output of xylidine and xylidine salt, used in the manufacture of Ponceau 2 R, Sudan II, and wool scarlets, decreased from 1,054,476 pounds in 1920 to 119,218 pounds in 1921.

Naphthalene derivatives.—As in the case of the benzene derivatives, the most important derivatives of this class showed large decreases in output in 1921. The production of refined naphthalene (solidifying 79° or above) reported to the Tariff Commission by firms primarily engaged in tar distillation, totaled 13,553,777 pounds, a decrease of 55 per cent from that of 1920. The sales of naphthalene during 1921 were 13,183,142 pounds, valued at $740,955, the price decreasing from $0.08 in 1920 to $0.06 per pound in 1921. This does not include the output of naphthalene at the coke ovens, data for which are being collected by the Geological Survey, but are not yet available for publication.

b-Naphthol (technical) shows the largest output of any of the naphthalene derivatives, namely, 2,959,049 pounds. This represents a 75 per cent decrease from that of the previous year. This important intermediate is consumed in large amounts in the preparation of a variety of dyes, color lakes, and other intermediates, and in the production of "Para red" on the fiber. The sales of b-naphthol for 1921 were 2,263,601 pounds, valued at $891,029. The price of b-naphthol in 1921 was 39 cents per pound, a reduction of 8 cents per pound from that of the previous year.

H acid (1-amino-8-naphthol-3:6-disulfonic acid) is one of the most important intermediates derived from naphthalene. It is of particular importance in the manufacture of direct cotton and acid dyes. The output in 1921 was 1,639,323 pounds, a decrease of 68 per cent from that of the previous year. The sales for 1921 were 988,277 pounds, valued at $945,945. The 1920 price was $1.23 per pound, while the 1921 figure had declined to 95 cents per pound.

Naphthionic acid (1-naphthylamine-4-sulfonic acid), used in the preparation of direct cotton dyes and also for the manufacture of Nevile and Winther's acid (1-naphthol-4-sulfonic acid), showed a production of 832,850 pounds for 1921. 1-amino-2-naphthol-4-sulfonic acid, used largely in the preparation of Salicine Black, showed an output of 449,996 pounds, a decrease of 54 per cent from that of the previous year. The production of a-naphthylamine, used in the prep-

aration of Fast Red B, Sulfoncyanine, Diamine Black F, and other blacks, as well as for certain intermediates, was 429,035 pounds, a 92 per cent decrease from that of 1920. 2-naphthol-6:8-disulfonic acid, consumed in the manufacture of Brilliant Croceine, Cochineal Red A, Diamine Scarlet B, and Wool Green B S, decreased 73 per cent in 1921, or to 396,926 pounds. The output of R acid (2-naphthol-3:6-disulfonic acid), used chiefly in the preparation of Ponceau R and also for Amaranth, Fast Red B, and Palatine Chrome Red B, was 322,902 pounds, a 74 per cent decrease from that of 1920.

Phthalic anhydride, used in the preparation of fluorescein, the eosines, rhodamines, and synthetic anthraquinone, showed a large reduction from the output of 796,210 pounds in 1920. This intermediate is of special importance, as it serves as a basis for the preparation of synthetic anthraquinone, which in turn is used for the production of vat and alizarin dyes.

Gamma acid (2-amino-8-naphthol-6-sulfonic acid), used in the manufacture of direct cotton dyes, including Diamine Black B H, Diamine Brown M, and Diamine Fast Red F, showed an output of 218,717 pounds, a 48 per cent decrease from the previous year. Other intermediates, which were reported in large quantities during 1921, showed the following decreases compared with the output of 1920: 2-naphthylamine-1-sulfonic acid, used for Lithol Red R, 54 per cent decrease, and Nevile and Winther's acid (1-naphthol-4-sulfonic acid), used for Azo Rubine, Congo Corinth, Benzoazurine G, Benzo Blue B X, and Diamond Black F, 67 per cent decrease. b-Naphthylamine showed a large reduction. Chicago acid (1-amino-8-naphthol-2:4-disulfonic acid), used in the preparation of Chicago Blue 4 B and R W and Brilliant Benzo Blue 6 B, also showed a considerable decrease. The production of J acid (2-amino-5-naphthol-7-sulfonic acid), which may be considered as a specialty intermediate used in the preparation of the higher classes of direct dyes distinguished by greater fastness to acids such as the benzo fast scarlets (first reported in 1920), decreased slightly.

Production was reported in 1921 of two important intermediates heretofore imported for use by the textile trade in the direct production of bright fast shades on cotton by both printers and dyers. These products were b-hydroxy-naphthoic anilide, known in the textile trade as Naphthol A S and b-hydroxy-napthoic toluide, sold under the trade name of Naphthol B S. The fast shades produced from these products in conjunction with certain other intermediates are competitive with vat and alizarin dyed goods. The output of 1-amino-8-naphthol-4-sulfonic acid used in the preparation of some of the faster direct blues showed a large increase in 1921. Production figures, however, for this, as well as certain other products, can not be published without revealing the individual operations of the manufacturer. Several new intermediates derived from naphthalene were first reported in 1921, among these were di (1-naphthol-3-sulfonic) urea, 2-nitro-naphthalene-4:8-disulfonic acid, and 1-naphthylamine-2:4:8-trisulfonic acid.

Anthracene derivatives.—While the technical progress of the American dye industry in the development of new dyes and the improvement of the quality of colors already derived from anthracene was gratifying, the actual output of the intermediates and dyes derived from anthracene was still considerably below domestic requirements. *The preparation of* vat dyes, including the indan-

threnes and most of the algol colors, requires anthraquinone as a raw material. Alizarin and the alizarin derivatives also use anthraquinone. In either case anthraquinone may be prepared from anthracene by oxidation, or may be synthesized from phthalic anhydride and benzene. The vat colors except indigo constituted 24.6 per cent of our 1921 imports. A large part of these were anthraquinone derivatives and future expansion to a well-balanced, self-contained industry will require considerably increased output in this field.

As was pointed out in 1920, the quantity of anthracene available, together with the anthraquinone prepared by the synthetic process, gives assurance that adequate supplies of this intermediate will be available when needed for the increased output of vat and alizarin colors.

The 1921 output of anthracene showed a large decrease from that of the previous year. The production of anthraquinone for 1921 was 125,358 pounds and for 1920, 539,619 pounds, which represents a 77 per cent decrease. It is understood, however, that the output in 1921, while only a fraction of the requirements of all anthraquinone dyes consumed in the United States, represents only a small percentage of the domestic capacity for the manufacture of this intermediate.

The production of b-amino anthraquinone, used in the manufacture of vat dyes, decreased slightly in 1921 from the 1920 output which was nine times greater than that of the previous year. Several anthraquinone derivatives were reported for the first time in 1921.

Imports of intermediates, 1921—The imports of coal-tar products entered for consumption during the years 1917 to 1921, inclusive, may be found in Part V. These statistics are collected by the Department of Commerce under the heads indicated in the tables. The more noteworthy imports during 1921 include 261,645 pounds of anthracene, purity of 25 per cent or more, with a value of $12,639, a large decrease from 1920 when 648,095 pounds were imported. The imports of anthraquinone in 1921 were 127,427 pounds with a value of $78,255, a large increase from the previous year when only 13,053 pounds were imported. A shortage of these two products existed as the result of the general reduction of manufacturing programs, and the imports supplied a considerable part of the raw material required for the preparation of vat and alizarin dyes derived from these intermediates.

The imports of naphthalene (solidifying at 79° or above) in 1921 showed a large decrease from that of the previous year. In 1921, 441,685 pounds with a value of $31,458 were imported and in 1920, 3,695,562 pounds, with a value of $416,172. These figures show that the large shortage of 1920, when the domestic demands were above normal, was greatly reduced by a modification of the domestic production program. The import of naphthol for 1921 was 333,356 pounds with a value of $192,922. This probably includes not only alpha- and beta-naphthol but a number of the special naphthols such as naphthol B S and A S used for the production of dyes on the fiber. No imports were given for naphthol during 1918 and 1919. The 1921 import of resorcinol was 109,658 pounds with a value of $75,022, which was about double the quantity imported in 1920. Imports of other intermediates are relatively small, when compared with domestic production.

TABLE 5.—*Production and sales of coal-tar intermediates during 1921.*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 79. An X signifies that the corresponding intermediates were made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there were sales of the corresponding intermediates in the United States during 1921, but that the figures can not be published without revealing information in regard to the sales of individual firms. The blank space in the sixth column indicates that there was actual production of the corresponding intermediates in the United States during 1921, but that the figures can not be published without revealing information in regard to the output of individual firms. The details thus concealed are, however, included in the totals. Reports have been received from all firms known to be manufacturers.]

Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
Total intermediates		*Pounds.* 33,637,326	8,483,463	$0.25	*Pounds.* 70,899,912
Acetanilide, tech	3, 22, 34, 112, 124, 145	12,865	2,957	.23	1,152,713
Acetyl-p-phenylenediamine (p-amino acetanilide)	53, 64, 69, 114, 116, 145			1.35	84,742
Acetyl-p-toluidine	34, 53, 145				
a-Aminoanthraquinone	10				
b-Aminoanthraquinone	53, 114, 116				
Aminoazobenzene	27, 34, 53, 55, 69, 70, 72, 93, 114, 145.			1.20	49,763
Aminoazotoluene	27, 34, 53, 69, 72, 114, 117.			.70	35,867
p-Aminobenzoic acid	76, 110, 144				
p-Aminodimethylaniline	X				
Aminodiphenylamine-o-sulfonic acid	5				
1-Amino-2-naphthol-4-sulfonic acid	22, 34, 53, 93, 117, 145, X.			1.01	449,996
1-Amino-8-naphthol-4-sulfonic acid	34, 114, 116				
1-Amino-8-naphthol-2:4-disulfonic acid (Chicago acid)	53, 114				
1-Amino-8-naphthol-3:6-disulfonic acid (H acid)	22, 53, 69, 109, 111, 114, 116, 117, 122.	988,277	945,945	.95	1,639,323
2-Amino-5-naphthol-7-sulfonic acid (J acid)	53, 114, 116				
2-Amino-8-naphthol-6-sulfonic acid (Gamma acid)	22, 24, 27, 93, 114, 116	32,528	68,373	2.10	218,717
5-Aminophenol-4-sulfonic acid	117				
o-Aminophenol	8, 144, 163, 167	9,366	21,581	2.30	12,775
o-Aminophenol-p-sulfonic acid	22, 69, 114, 117, 167			.95	54,355
p-Aminophenol and hydrochloride	8, 31, 53, 93, 116, 144, 163, 167.	40,587	56,275	1.39	72,572
Aminophenyltolylamine sulfonic acid	116				
Aminosalicylic acid	24, 45, 53, 114				
Anilide benzene thiazol and derivatives	X				
Aniline oil	24, 27, 53, 108, 112, 114, 134, X, X.	5,259,598	1,161,381	.22	5,639,234
Aniline salt (and sulphate)	24, 72, 114, X	366,533	97,225	.27	
Aniline tar red	114				
o-Anisidine	114, 116				
Anthracene blue, base	114				
Anthracene, refined	138				
Anthranilic acid (o-aminobenzoic)	53, 61, 112, 160			1.67	35,616
Anthraquinone	19, 53, 88, 114, 141, 156	29,422	46,700	1.59	125,358
Anthraquinone-1:5-disulfonic acid	10, 69, 114				
Anthraquinone-1:5-and-1:8-disulfonic acid	116				
Anthraquinone-2-sodium sulfonate (silver salt)	10, 19, 53, 116				
Anthraquinone-1:8-dinitro-1:5-disulfonic acid	116				
Arsanilic acid	47				
Benzalchloride and benzotrichloride	61, X				
Benzaldehyde	61, 89, 124, 143, 162, X	82,234	39,217	.72	66,365
Benzanthrone	10, 53, 116				
Benzidine base and sulfate	2, 6, 22, 53, 70, 111, 114, 116, 161, X.	277,388	235,076	.85	328,577
Benzoate of soda	79, 124, 144, X, X	413,505	235,784	.57	381,154
Benzoic acid, U. S. P	79, 124, 143, 144, X	29,734	18,432	.62	190,483

TABLE 5.—*Production and sales of coal-tar intermediates during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Benzoic acid, tech	79, 144				
Benzoyl benzoic acid	116				
Benzoyl chloride	79				
Benzyl acetate	X				
Benzyl alcohol	89, 144, 150, 162, X, X, X.	9,959	10,142	1.02	17,152
Benzylamine	X				
Benzyl chloride	61, 79, 124, 143, 162			.28	473,286
Broenner's acid. (*See* 2-naphthylamine-5-sulfonic acid).					
Bromobenzene	61				
Carbazole, refined	61				
o-Chlorobenzaldehyde	114				
Chlorobenzanthrone	53				
Chlorobenzene (mono)	79, 93, 143			.08	1,602,624
Chlorometanilic acid	64				
Chloronaphthalene	X				
1-Chloro-8-naphthol-3:6-disulfonic acid.	114				
2-Chloro-5-nitrotoluene-4-sulfonic acid.	145				
Chlorotoluene	114				
2-Chloro-5-toluidine-4-sulfonic acid	97, 100, 145				
Chromotropic acid. (*See* 1:8-dihydroxy naphthalene-3:6-disulfonic acid.					
Cinnamic acid	89, 150, X, X	807	2,538	3.14	778
Creosote oil, containing more than 5 per cent tar acids.	13, 46, 174				
Cresol, ortho, meta and para	17, 102				
o-Cresol, purity of 90 per cent or more.	17, 151				
o-Cresotinic acid	X				
Dehydrothio-p-toluidine sulfonic acid.	59, 64, 114, X			1.78	18,284
1:5-Diamino anthraquinone	10				
2:6-Diaminophenol-4-sulfonic acid.	117				
Diamin ostilbene disulfonic acid	59, 114, 116				66,999
Dianisidine	53, 114, 116				
1-Diazo-2-napthol-4-sulfonic acid.	22, 93, 117				
Dibenzanthrone	116				
Dichloroaniline	5, 116				
o-Dichlorobenzene	93				
p-Dichlorobenzene	53, 79, 93, 121, 143	375,543	61,363	.16	402,299
Diethyl-m-aminophenol	53				
Diethylaniline	30, 53, 76, 114, 152			.97	33,812
1:5-Dihydroxy-anthraquinone	114				
1:5-Dihydroxy-4:8-dinitroanthraquinone-3:6-disulfonic acid.	116				
1:5-Dihydroxynaphthalene	69, 116, 117				
1:8-Dihydroxynaphthalene-3:6-disulfonic acid (chromotropic acid).	53, 114, 116				
Dimethylaniline	6, 24, 27, 53, 103, 114, X	390,931	210,910	.54	566,286
Di(1-naphthol-3-sulfonic)-urea	114				
Dinitroacetanilide	53				
Dinitroanthraquinone	114				
Dinitrobenzene	14, 24, 53, 114, 103	333,528	72,607	.22	894,219
m-Dinitrobenzene	111				
Dinitrochlorobenzene	14, 53, 69, 93, 114, 170			.21	2,408,473
p-Dinitrochlorobenzene	116				
Dinitrodibenzanthrone	116				
Dinitrohydroxyphenylamine	116				
Dinitronaphthalene	116				
Dinitrophenol, and sodium salt	14, 69				
2:6-Dinitrophenol-4-sulfonic acid	117				
Dinitrotoluene	14, 53, 55, 65, 72, 114, 116	182,229	41,556	.23	1,065,323
Diphenylamine	53				
Diphenylmethane and sulfonate	114				
Distilbene diphenol	114				
Ethyl acetanilide	114				
Ethyl-p-aminoacetanilide	114				
Ethyl-p-aminobenzoate	110				
Ethylbenzylaniline	30, 53, 76, 152, 164			1.60	16,94
Ethylbenzylaniline sulfonic acid	30, 114				

TABLE 5.—*Production and sales of coal-tar intermediates during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Ethylbenzylaniline disulfonic acid	30, 64				
Flavanthrene	116				
Fluorescein	72, 114				
Formaldehyde-p-amino-dimethylaniline	X				
Formanilide	145, X				
Gamma acid. (*See* 2-amino-8-naphthol-6-sulfonic acid).					
H Acid. (*See* 1-amino-8-naphthol-3:6-disulfonic acid.)					
m-Hydroxy benzaldehyde	30				
b-Hydroxy naphthoic acid	34, 53				
b-Hydroxy naphthoic anilide	53				
b-Hydroxy naphthoic toluide	53				
p-Hydroxy phenyl arsonic acid and sodium salt	47, 105				
Indanthrene blue RS	116				
Laurent's acid. (*See* 1-naphthylamine-5-sulfonic acid.)					
Metanilic acid	5, 53, 55, 72, 114, 117, X	10,570	8,876	.84	50,647
Methylene aniline	X				
Methylene base	53				
Methylene diphenyldiamine	X				
Michler's hydrol. (*See* Tetramethyldiaminobenzhydrol.)					
Michler's ketone. (*See* Tetramethyldiaminobenzophenone.)					
Monomethylaniline	30, 53, 76, 114			1.09	27,479
Naphthalene, solidifying 79° C. or above (refined, flake).	13, 17, 29, 99, 138, 143, 166, 174, X.	13,183,142	740,955	.06	13,553,777
Naphthalene-1:5-disulfonic acid	69				
Naphthalene-2:7-disulfonic acid	145				
a-Naphthol	34, 72, 80, 114, 155			1.07	95,735
b-Naphthol, tech	24, 27, 34, 53, 72, 130, 145.	2,263,601	891,029	.39	2,959,049
S-Naphthol, U. S. P	24, 130				
1-Naphthol-4-sulfonic acid (Neville & Winther's acid).	2, 24, 27, 34, 45, 53, 114, 116, 117.	6,680	8,173	1.22	182,595
1-Naphthol-5-sulfonic acid	5, 53, 114, 116, 117			1.45	92,571
1-Naphthol-3:6-disulfonic acid	2				
1-Naphthol-3:6:8-trisulfonic acid	27, 53, 114, 116			.55	178,906
2-Naphthol-1-sulfonic acid	56, 130				
2-Naphthol-6-sulfonic acid (Schaeffer's acid).	5, 34, 55, 69, 114, 116, 117.			.62	168,835
2-Naphthol-7-sulfonic acid	34, 145				
2-Naphthol-8-sulfonic acid	X				
2-Naphthol-3:6-disulfonic acid	2, 22, 24, 27, 34, 53, 54, 69, 114, 116, 117, 145, 146, 160, 164.	66,968	43,323	.65	322,902
2-Naphthol-6:8-disulfonic acid	22, 24, 27, 34, 53, 54, 114, 145.			.61	396,926
a-Naphthylamine	17, 53, 93, 116			.30	429,035
b-Naphthylamine	34, 53, 114, 130	28,642	32,453	1.13	102,079
1-Naphthylamine-4-sulfonic acid (naphthionic acid).	2, 27, 45, 53, 72, 93, 114, 116, 117, X.			.44	832,850
1-Naphthylamine-5-sulfonic acid (Laurent's acid).	27, 53, 64, 69, 114, 117, 137.			.57	166,616
1-Naphthylamine-6-sulfonic acid	53, 114				
1-Naphthylamine-6 and 7-sulfonic acid.	34, 116				
1-Naphthylamine-8-sulfonic acid	53, 64, 69, 114, 117, 137			.98	533,755
1-Naphthylamine-2:4:8-trisulfonic acid.	114				
1-Naphthylamine-3:8-disulfonic acid.	2, 34, 116				
1-Naphthylamine-4:8-disulfonic acid.	34, 114, 116			1.04	260,823
1-Naphthylamine-3:6:8-trisulfonic acid.	22, 53, 69, 114, 116, 122			.39	2,926,003
2-Naphthylamine-1-sulfonic acid	5, 34, 56, 130, 145, X	38,736	60,689	1.57	149,014
2-Naphthylamine-6-sulfonic acid (Bronner's acid).	34, 114, 116				
2-Naphthylamine-4:8-disulfonic acid.	116				

TABLE 5.—*Production and sales of coal-tar intermediates during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
2-Naphthylamine-5:7-disulfonic acid.	53, 114, 116				
2-Naphthylamine-6:8-disulfonic acid.	22, 53, 114, 116			$0.75	247,337
Nevile and Winther's acid. (*See* 1-naphthol-4-sulfonic acid.)					
p-Nitroacetanilide	34, 114, 145, X			.63	288,768
Nitroaminophenol	69, 167				
m-Nitroaniline	53, 163				
p-Nitroaniline	6, 22, 34, 53, 116, 144, 145, 157, X.	621,559	$526,403	.85	822,458
p-Nitroaniline-o-sulfonic acid	5, 53, 64, 69, 145, 167			1.46	64,488
o-Nitroanisole	114, 116				
m-Nitrobenzaldehyde	114				
Nitrobenzene (oil of myrbane)	24, 27, 53, 114, 116, 134, X.	957,556	112,643	.12	7,443,122
Nitrobenzidine sulphate	116				
p-Nitrobenzoic acid	144				
m-Nitrochlorobenzene	14				
o-Nitrochlorobenzene	14, 112				
p-Nitrochlorobenzene	14, 53, 112, 114	119,495	27,202	.23	51,744
p-Nitrochlorobenzene-o-sulfonic acid.	5, 53				
p-Nitrochlorobenzene-6-sulfonic acid.	145				
8-Nitro-1-diazo-2-naphthol-4-sulfonic acid.	22				
3-Nitro-4-hydroxyphenyl arsonic acid.	47, 105, 110				
Nitronaphthalene	17, 53, 116				
2-Nitronaphthalene-4:8-disulfonic acid.	34				
o-Nitrophenol	8, 70, 163, 167	24,368	15,853	.65	50,683
p-Nitrophenol	8, 53, 112, 116, 163, 167			.49	86,216
2-Nitrophenol-4-sulfonic acid	117				
Nitrosobetanaphthol	X				
Nitrosodimethylaniline	24, 53, 70 93, 114, 116, 151.			1.56	104,690
p-Nitrosodimethylaniline	114				
Nitrosophenol	14, 31, 69, 77, 93, 114, 157.				111,681
Nitrosulfoanthrarufin	114				
Nitrotoluene	14, 34, 53, 55, 72, 116, X				2,342,008
o-Nitrotoluene	14, 53, 65, 114, 116, X	39,054	3,337	.09	727,177
p-Nitrotoluene-o-sulfonic acid	5, 34, 64, 114, 116				321,264
p-Nitrotoluene	14, 34, 53, 65, 114, 116, X.	35,886	19,185	.50	566,551
m-Nitro-p-toluidine	34, 53, 145	45,126	125,768	2.79	70,094
p-Nitro-o-toluidine	160				
Nitroxylene	24, 27, 34, 116				191,340
Oxalylarsanilic acid	110				
Phenazine	93				
Phenol	17, 102, 143	292,645	41,617	.14	
Phenyl-a-naphthylamine	22, 53				
Phenyl-l-naphthylamine-8-sulfonic acid.	53, 64, 69, 114, 117, 137			.98	204,647
m-Phenylenediamine	8, 14, 24, 30, 53, 69, 111, 114, 116, 163.	96,777	102,919	1.06	301,169
m-Phenylenediamine sulfonic acid.	53				
p-Phenylenediamine	144, 145, 157	124,954	212,613	1.70	
Phenylglycine, sodium salt	114				
Phenylhydrazine-p-sulfonic acid	24, 53				
Phthalamide	160				
Phthalic acid and anhydride	53, 112, X	202,471	79,162	.39	
Picramic acid	22, 24, 53, 114, X	35,706	23,858	.67	254,904
Primuline	64, 114, 126				
Quinoline yellow, base	114				
Resorcinol, U. S. P. and tech	114, 127, 139, X	33,268	59,696	1.79	35,483
Rosaniline	50				
Salicylic acid, U. S. P	52, 108, 112, 143, X	1,185,062	279,072	.24	1,722,575
Salicylic acid, tech	53, 108, 112, 143, X	131,532	25,725	.19	1,177,752
Schaeffer's acid. (*See* 2-naphthol-6-sulfonic acid).					

.—*Production and sales of coal-tar intermediates during 1921*—Continued.

mon name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921. Quantity.	Value.	Average price per pound.	Production, 1921.
		Pounds.			*Pounds.*
d	6, 24, 27, 34, 53, 69, 72, 114, 163.	171,117	$41,636	$0.24	1,071,904
ic acid, chloride of	83				
ic acid and ammo-	83				
diaminobenzhydrol hydrol).	53, 54, 64, 69, 114				58,582
ldiaminobenzophe- ler's ketone).	22, 53				
diaminodiphenyl-	54, 64				
ide	114, 134, 151, X, X, X	376,368	157,046	.42	1,185,462
salts	53, 111, 114, 116				
lfonic acid	X				
lfamide	70, 112				
lfamide	112				
lfochloride	112				
lfo ethyl ester	114				
	53, 65, 114, X	148,107	38,128	.28	
	14, 53, 65, 114, 116, X	83,324	21,065	.25	208,505
	14, 34, 53, 65, 114, 116, X	92,347	52,985	.57	268,629
ulfonic acid	6, 53, 72, 114			.50	33,923
-sulfonic acid	34				
iamine	8, 14, 53, 55, 69, 93, 114, 116.	147,259	167,796	1.14	621,359
iamine sulfonic acid	114				
amine	14				
e	114				
hylamine-8-sulfonic	114				
osphate	X				
anidine	114				
osphate	142				
l salt	24, 27, 34, 53, 114, 116	9,215	4,503	.49	119,218
ediates	116				
micals (see Table	58, 70, 132, 151, 169, X	901	18,334	20.35	2,012

6.—*Comparison of the production of coal-tar intermediates, 1920 and 1921.*

Name.	Total production. 1921 Quantity.	1920 Quantity.
	Pounds.	*Pounds.*
ntermediates	70,899,912	257,726,911
tech	1,152,713	2,667,252
nylenediamine (p-amino acetanilide)	84,742	97,275
azene	49,763	152,310
phthol-4-sulfonic acid	449,996	971,370
phthol-3:6-disulfonic acid (H acid)	1,639,323	5,180,993
phthol-6-sulfonic acid (Gamma acid)	218,717	418,456
ol and hydrochloride	72,572	41,474
	5,639,234	39,234,186
ne	125,358	539,619
le	66,365	702,543
se and sulfate	328,577	2,183,583
oda	381,154	812,193
ol	17,152	38,807
ide	473,296	1,246,412
e (mono)	1,692,624	4,829,142
d	778	11,517
-p-toluidine sulfonic acid	18,204	51,961
ene disulfonic acid	66,909	142,227
nzene	402,289	465,292
ne	32,812	180,542
line	566,286	5,447,107
ne	894,209	2,492,178
obenzene	2,408,472	5,947,791

TABLE 6.—*Comparison of the production of coal-tar intermediates, 1920 and 192*

Name.	Total produc	
	1921 Quantity.	Q
	Pounds.	*P*
Dinitrotoluene	1,065,323	
Ethylbenzylaniline	16,949	
Metanilic acid	50,647	
Naphthalene, solidifying 79° C. or above (refined, flake)	13,553,777	
b-Naphthol, tech	2,959,049	
1-Naphthol-4-sulfonic acid (Neville & Winther's acid)	182,595	
2-Naphthol-6-sulfonic acid (Schaeffer's acid)	168,835	
2-Naphthol-3:6-disulfonic acid	322,902	
2-Naphthol-6:8-disulfonic acid	396,926	
a-Naphthylamine	429,035	
1-Naphthylamine-4-sulfonic acid (naphthionic acid)	832,850	
1-Naphthylamine-5-sulfonic acid (Laurent's acid)	166,616	
1-Naphthylamine-8-sulfonic acid	535,755	
1-Naphthylamine-3:6:8-trisulfonic acid	2,026,003	
2-Naphthylamine-1-sulfonic acid	149,014	
2-Naphthylamine-6:8-disulfonic acid	247,357	
p-Nitroacetanilide	288,748	
p-Nitroaniline	832,438	
Nitrobenzene (oil of myrbane)	7,443,192	5
p-Nitrochlorobenzene	51,744	
p-Nitrophenol	86,216	
Nitrosodimethylaniline	104,690	
Nitrosophenol	111,681	
Nitrotoluene	2,342,098	
o-Nitrotoluene	727,177	
p-Nitrotoluene	566,551	
m-Nitro-p-toluidine	70,094	
Nitroxylene	191,840	
m-Phenylenediamine	301,169	
Picramic acid	254,904	
Resorcinol, U. S. P. and tech	35,483	
Salicylic acid, U. S. P.	1,722,575	
Salicylic acid, tech	1,777,752	
Sulfanilic acid	1,071,904	
Tetramethyldiaminobenzhydrol (Michler's hydrol)	58,582	
Thiocarbanilide	1,185,462	
o-Toluidine	208,505	
p-Toluidine	268,629	
m-Tolylenediamine	621,359	
Xylidine and salt	119,218	

TABLE 7.—*Production of coal-tar chemicals for sale for research and exper purposes, 1921.*

Common name.	Manufacturers' identification numbers.[1]	Sales.		
		Pounds.	Value.	
Total		901	$18,334	
Acetyl-m-aminobenzoic acid	58			
Acetyl-p-aminobenzoic acid	58			
Acetyl-o-aminophenol	58			
Acetyl-p-anisidine	58			
Acetylanthranilic acid	58			
Acetyl-n-butylaniline	58			
Acetyldiphenylamine	58			
Acetyl-p-methylaminophenol	58			
Acetylmethyl-o-toluidine	58			
Acetylmethyl-p-toluidine	58			
Acetylphenylglycine	58			
Acetylphenylhydrazine	58,151			
Acetyl-n-propylaniline	58			
Acetyl-o-toluidine	58			
Acetyl-p-toluidine	58			
p-Aminoacetophenone	58			
2-Amino-5-azotoluene	58			
2-Amino-5-azotoluene hydrochloride	58			
m-Aminobenzoic acid	58			
p-Aminobenzoic acid	58			
p-Aminodimethylaniline hydrochloride	58			

[1] See Table 5, p. 21, for explanation of the numbers.

.—Production of coal-tar chemicals for sale for research and experimental purposes, 1921—Continued.

Common name.	Manufacturers' identification numbers.	Sales.		Production, 1921.
		Pounds.	Value.	
				Pounds.
iphenyl sulfate	58			
-hydroxytoluene sulfate	58			
phenol	58			
luene-2-sulfonic acid	58			
n-xylene	58			
xylene	58			
d	58			
ne	58			
	58			
	151			
ne	58			
izene	58			
minophenol	58			
ne	58			
loride	58			
le	58, 151			
de	58, 151			
(Cryst., Thiophene free)	58			
so-o-cresol	58			
ulfochloride	58			
ulfonamide	58			
e, base	169			
	58, 151			
dioxime	58			
cid	58, 151			
nhydride	58			
	58, 151			
rile	58			
enone	58			
rialanine	58			
bromide	58			
rbinol	58			
a-naphthylamine	58			
peroxide	151			
piperidine	58			
mine	58, 151			
minophenol hydrochloride	58			
romide	58			
hyl ether	58			
ethyl ether	58			
acetanilide	58			
etophenone	58			
sandine	58			
aniline	58			
aniline hydrochloride	58			
benzyl chloride	58			
benzyl chloride	58			
clohexanol	58			
droquinol	58			
naphthalene	58			
naphthalene	58			
phenylhydrazine	58, 151			
phenylhydrazine hydrochloride	58			
toluene	58			
otoluene	58			
toluene	58			
amine	58			
benzoate	58			
benzyl ether	58			
o-cresyl ether	58			
o-methoxy benzoate	58			
phenyl ether	58			
salicylate	58			
anilide	58			
ide	58			
ybenzeneazodimethylaniline	151			
ybenzeneazodipropylaniline	151			
	58			
l	58			
acetanilide	58			
etophenone	58			
aniline	58			
aniline	58			
benzaldehyde	58			
benzaldehyde	58			
benzoic acid	58			
benzoic acid	58			

TABLE 7.—*Production of coal-tar chemicals for sale for research and experimental 1921*—Continued.

Common name.	Manufacturers' identification numbers.	Sales.	
		Pounds.	Value.
o-Chlorobenzyl bromide	58		
p-Chlorobenzyl bromide	58		
o-Chlorobenzyl chloride	58		
p-Chlorobenzyl chloride	58		
Chlorocyclohexane	58		
Chlorohydroquinone	58		
2-Chloro-5-hydroxytoluene	58		
o-Chlorotoluene	58		
p-Chlorotoluene	58		
2-Chlorotoluene-5-sulfonic acid	58		
o-Cresol-sulfone-phthalein	151		
o-Cresyl benzoate	58		
m-Cresyl benzoate	58		
o-Cresylmethyl ether	58		
m-Cresylmethyl ether	58		
p-Cresylmethyl ether	58		
Cupferron (Ammonium nitroso-b-phenylhydroxylamine)	58, 70, 151		
p-Cyanobenzoic acid	58		
Cyclohexanone	58		
Cyclohexene	58		
Cyclohexyl acetate	58		
Diacetyl-o-phenylenediamine	58		
p-p-Diaminodiphenylmethane	58		
2:5-Diaminotoluene hydrochloride (Tolylene-2:5-diamine hydrochloride)	58		
Dibenzoylethylene diamine	58		
Dibenzyl	58		
Dibenzylamine	58		
Dibromothymolsulfonephthalein	151		
Dibromo-o-cresolsulfonephthalein	151		
Dibromonaphthalene	58		
Dibromophenol	151		
Di-n-butylaniline	58		
2:4-Dichloroaniline	58		
o-Dichlorobenzene	58		
2:5-Dichlorobenzene sulfonic acid	58		
2:6-Dichloro-4-nitroaniline	58		
m-Diethylaminophenol	58		
Diethyl a-naphthylamine	58		
Di-a-naphthyl urea	58		
Diethyl-o-toluidine	58		
Diethyl-p-toluidine	58		
p-Diiodobenzene	58		
Dimethylaminoazobenzene	132		
p-Dimethylaminoazobenzene	58, 151		
Dimethylaminobenzaldehyde	132		
p-Dimethylaminobenzaldehyde	58		
m-Dimethylaminophenol	58		
p-Dimethylaminophenol sulfate	58		
p-Dimethylaminophenyl acetate	58		
Dimethyl-a-naphthylamine	58		
2:4-Dimethylquinoline	58		
2:4-Dimethylquinoline sulfate	58		
2:6-Dimethylquinoline	58		
Dimethyl-o-toluidine	58		
Dimethyl-p-toluidine	58		
2:4-Dinitrobenzoic acid	58		
3:5-Dinitrobenzoic acid	58		
Dinitrobenzoylene urea	151		
m-Dinitrobenzoylene urea	58		
Dinitrohydroquinone diacetate	58		
1:5-Dinitronaphthalene	58		
Diphenyl	58		
Diphenylcarbazide	58		
Diphenyl carbonate	58		
Diphenylethylenediamine	58		
as-Diphenylhydrazine	58		
as-Diphenylhydrazine hydrochloride	58		
Diphenylnitrosoamine	58		
Diphenylpiperazine	58		
Diphenylpiperazine hydrochloride	58		
Diphenyl sulfide	58		
Diphenylurethane	58		
Di-n-propylaniline	58		
Di-p-tolylketone	58		
Ethylbenzene	58		
Ethyl-a-naphthylamine	58		
Ethyl-m-nitrobenzoate	58		

7.—*Production of coal-tar chemicals for sale for research and experimental purposes, 1921*—Continued.

Common name.	Manufacturers' identification numbers.	Sales.		Production, 1921.
		Pounds.	Value.	
				Pounds.
enyl bromoacetate	58			
toluidine	58			
toluidine	58			
ilide	58			
liphenylamine	58			
c acid	58			
inobenzoic acid	58			
inol diacetate	58			
inol dimethyl ether	58			
inol monomethyl ether	58			
xyazobenzene	58			
xyphenylglycine	58			
xyquinoline	58			
etanilide	58			
iline	58			
ene	58			
nzoic acid	58			
nsoic acid	58			
l	70, 151			
xybenzaldehyde	58			
xybenzoic acid	58			
xyquinoline	58			
etanilide	58			
niline	58			
nthranilic acid	58			
lbenzoxazole	58			
yclohexane	58			
cyclohexanol	58			
cyclohexanol	58			
thylaniline	58			
cyclohexanol	58			
-methoxybenzoate	58			
nethyl anthranilate	58			
-naphthylamine	58			
-nitrobenzoate	58			
n-nitrobenzoate	58			
range	151			
-phenylenediamine	58			
henylhydrazine	58, 151			
quinoline	58			
-toluidine	58			
-tolyl ketone	58			
halenesulfochloride	58			
halene sulfonic acid	58			
lene tetrachloride	58			
haquinaldine	58			
holbenzein	58			
hylamine acetate	132			
hylamine hydrochloride	132			
hylamine sulfate	132			
hylamine hydrochloride	132			
hyl iso-amyl ether	58			
-acetylaminotoluene	58			
xylene	58			
niline	58			
nside	58			
enzyl chloride	58			
enzene sulfonic acid	58			
enzoic acid	58			
enzoic acid	58, 151			
enzoic acid	151			
enzoyl chloride	58			
enzoyl chloride	58			
enzyl bromide	58			
enzyl chloride	58			
romobenzene	58			
bromobenzene	58			
romobenzene	58			
chlorobenzene	58			
hlorobenzene-2-sulfonic acid	58			
iene	58			
dimethylaniline	58			
imethylaniline	58			
iphenylamine	58			
odobenzene	58			
odobenzene	58			
nethylacetanilide	58			
methylaniline	58			

TABLE 7.—*Production of coal-tar chemicals for sale for research and experimental purposes, 1921*—Continued.

Common name.	Manufacturers' identification numbers.	Sales.		Production, 1921.
		Pounds.	Value.	
				Pounds.
1-Nitro-1-methylcyclohexane	58			
p-Nitrophenylhydrazine	58, 151			
6-Nitroquinaldine	58			
6-Nitroquinoline	58			
p-Nitrosodiethylaniline	58			
Nitrosodimethylaniline hydrochloride	132			
p-Nitrosodiphenylamine	58			
Nitroso-b-naphthol	58, 151			
m-Nitrotoluene	58			
Orcinol	58			
Oxanilide	58			
Phenacetolin	151			
Phenetole	58			
Phenolsulfonephthalein	151			
Phenol sulfonic acid	132			
Phenylacetyl chloride	58			
Phenylalanine	151			
Phenyl benzoate	58			
Phenylbenzylhydrazine	151			
o-Phenylenediamine hydrochloride	58			
Phenylhydrazine	132, 151			
Phenylhydrazine acetate	151			
Phenylhydrazine hydrochloride	132, 151			
Phenylhydrazine p-sulfonic acid	58, 151			
b-Phenylhydroxylamine	151			
Phenylhydroxylamine oxalate	58			
Phenyl isocyanate	58			
Phenylmethyl carbinol	58			
Phenyl phthalate	58			
Phenylthiohydantoic acid	58			
Phenyl-p-toluene sulfonate	58			
Phenyl-p-tolyl ketone	58			
Phenylurethane	58			
Phloroglucinol	58, 132, 151, x			
Phthalic acid	58			
Phthalyl chloride	58			
a-Picoline	58			
Picramic acid	58, 169			
Picryl chloride	58			
Piperidine	58			
Potassium hydrogen phthalate	58			
Potassium benzene sulfonate	151			
Propionanilide	58			
n-Propyl chlorocarbonate	58			
n-Propylaniline	58			
Pyridine (pure)	58			
Quinaldine	58, 151			
Quinhydrone	58			
Quinoline	58, 151			
Quinone	58, 151			
Resorcinol diacetate	58			
Resorcinol dimethyl ether	58			
Resorcinol monoacetate	58			
Resorcinol monomethyl ether	58			
Salicylamide	58			
Sodium benzene sulfonate	151			
Sodium m-benzene disulfonate	58			
Sodium p-chlorobenzene sulfonate	58			
Sodium chlorobenzene—3:5-disulfonate	58			
Sodium 2-chlorotoluene-4-sulfonate	58			
Sodium o-dichlorobenzene sulfonate	58			
Sodium 2:5-dichlorobenzene sulfonate	58			
Sodium m-diethylaminobenzene sulfonate	58			
Sodium m-ethylaminobenzene sulfonate	58			
Sodium 1-naphthol-2-sulfonate	58			
Sodium m-nitrobenzene sulfonate	58			
Sodium m-nitrobenzoate	58			
Sodium 5-nitrodiphenylamine-2-sulfonate	58			
Sodium phenylhydrazine sulfonate	151			
Sodium toluene-2:4-disulfonate	58			
Sodium o-xylene sulfonate	58			
Sodium p-xylene sulfonate	58			
Sulfosalicylic acid	58			
Terephthalic acid	58			
Tetrabromophenolsulfonephthalein	151			
Tetrabromo-o-cresol	58			
Tetrachlorophthalic acid	58			
Tetramethyl-p-phenylenediamine	58			

TABLE 7.—*Production of coal-tar chemicals for sale for research and experimental purposes, 1921*—Continued.

Common name.	Manufacturers' identification numbers.	Sales.		Production, 1921.
		Pounds.	Value.	
				Pounds.
p-Thiocresol	58			
Thio-b-naphthol	58			
Thiophenol	58			
Thymolsulfonephthalein	151			
p-Tolualdehyde	58			
p-Toluamide	58			
Toluene (thiophene free)	58			
p-Toluenesulfonylaniline	58			
p-Toluenesulfonylmethylaniline	58			
p-Toluenesulfonyl-p-toluidine	58			
m-Toluidine	58			
p-Tolylhydrazine hydrochloride	58			
Tribenzylamine	58			
2:4:6-Trinitrobenzaldehyde	58			
Trinitrobenzene	151			
1:2:3-Trinitrobenzene	58			
2:4:5-Trinitrobenzoic acid	58			
Triphenylchloromethane	58			
Triphenylguanidine	58			
Triphenylmethane	58			
Tyrosine	151			
Veratrole	58			
Xanthone	58			
o-Xylene	58			
m-Xylene	58			
p-Xylene	58			
o-Xylenol	58			
m-Xylenol	58			
p-Xylenol	58			
o-Xylyl bromide	58			
o-Xylylene bromide	58			
p-Xylylene bromide	58			

TABLE 8.—*Comparison of imports, 1914 and 1921, with the production of dyes, 1917 to 1921, inclusive, by classes.*

Class.	1914 [1]		1917 [2]		1918 [2]	
	Imports.	Per cent of total.	United States production.	Per cent of total.	United States production.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
Acid	9,286,501	20.2	9,372,121	20.4	9,799,071	16.8
Basic	3,002,480	6.5	2,073,043	4.5	2,879,639	4.9
Direct	10,264,757	22.3	11,181,761	24.3	12,285,683	21.1
Lake and spirit soluble	1,512,605	3.3	934,360	2.2	1,068,466	1.8
Mordant and chrome	4,450,442	9.7	4,164,902	9.1	5,447,192	9.3
Sulfur	7,053,879	15.4	15,588,222	33.9	23,698,826	40.5
Vats (including indigo)	10,352,693	22.5	289,296	.6	3,281,337	5.6
(a) Indigo	8,407,359	18.3	274,771	.55	3,083,888	5.3
(b) Other vats	1,945,304	4.2	14,525	.05	197,449	.3
Unclassified	27,568	.1	2,368,541	5.0	4,232	
Total	45,950,895	100.0	45,977,246	100.0	58,464,446	100.0

Class.	1919 [2]		1920 [2]			
	United States production.	Per cent of total.	United States production.	Per cent of total.	Imports.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
Acid	12,195,968	19.2	17,741,538	20.1	733,405	21.5
Basic	4,036,532	6.4	4,993,001	5.7	192,163	5.7
Direct	14,444,934	22.8	19,882,631	22.5	571,581	16.8
Lake and spirit soluble	1,813,199	2.8	2,205,281	2.5	17,527	.5
Mordant and chrome	3,985,050	6.3	3,900,209	4.4	709,482	20.9
Sulfur	17,624,418	27.8	20,034,500	22.7	229,140	6.7
Vats (including indigo)	9,252,982	14.6	19,338,099	21.9	932,464	27.4
(a) Indigo	8,863,824	14.0	18,178,231	20.6	171,101	5.0
(b) Other vats	389,158	.6	1,159,868	1.3	761,363	22.4
Unclassified	49,111	.1	168,517	.2	16,820	.5
Total	63,402,194	100.0	88,263,776	100.0	3,402,582	100.0

[1] Fiscal year. [2] Calendar year.

TABLE 8.—*Comparison of imports, 1914 and 1921, with the production of dyes, 19 1921, inclusive, by classes*—Continued.

Class.	1921 [1]			
	United States production.	Per cent of total.	Imports.	Per of to
	Pounds.		*Pounds.*	
Acid	7,843,009	20.11	1,455,823	
Basic	1,853,094	4.75	163,527	
Direct	7,053,761	18.08	537,664	
Lake and spirit soluble	720,406	1.85	43,553	
Mordant and chrome	3,997,442	10.25	695,961	
Sulfur	10,239,255	26.25	220,938	
Vats (including indigo)	7,019,120	17.99	1,116,345	
(a) Indigo	6,673,968	17.11	70,975	
(b) Other vats	345,152	.88	1,045,370	
Unclassified	282,603	.72	19,100	
Total	39,008,690	100.00	4,252,911	1

[1] Calendar year.

DYES AND OTHER FINISHED COAL-TAR PRODUCTS.

INTRODUCTORY.

The finished coal-tar products are divided into the following eig classes: (1) Dyes, (2) color lakes, (3) photographic chemicals (dev opers), (4) medicinals, (5) flavors, (6) perfume materials, (7) sy thetic phenolic resins, (8) synthetic tanning materials. In previo reports [1] the commission has emphasized the close relationship th exists between the manufacture of explosives, poison gases, and dy and the fact that many explosive plants since the signing of t armistice have been converted into dye factories. The dye indust is also closely connected with the manufacture of flavors, perfu materials, photographic chemicals, medicinals, and other coal-tar pro ucts, which, although produced in smaller quantities than dyes, u many of the by-products obtained in the manufacture of coal-tar dye

The production of dyes and other finished products during th calendar year 1921 is shown in Table 18, page 62, in as great detail possible, without revealing the output of individual manufacturer In Table 19, page 72, the production of individual dyes in 1921 is com pared with the output of the same dyes in 1920, in case the figur could be published.

The total output of dyes and other finished coal-tar chemicals 1921 by 147 firms was 51,457,565 pounds, compared with 112,942,2 pounds, valued at $112,731,547, by 161 firms in 1920. The tot sales of dyes and other finished coal-tar products in 1921 was 60,434 009 pounds, valued at $47,996,514. The 1921 production represen a 54 per cent decrease from the quantity produced in 1920, and th sales of 1921 constitute a 46.5 per cent decrease from the quanti produced in the previous year.

DYES—SUMMARY OF PRODUCTION IN 1921.

The domestic production of dyes by 74 firms in 1921 was 39,008,6 pounds, a decrease of 56 per cent from that of 1920. The sal during 1921 totaled 47,513,762 pounds with a value of $39,283,95 The sales exceeded production by 22 per cent, indicating that pa

[1] *Census of Dyes* and Coal-Tar Chemicals, 1917, 1918, 1919, and 1920.

of the domestic consumption for 1921 was supplied from stocks carried over from the previous year's abnormally high output. The pre-war domestic production of coal-tar colors in 1914 by 7 firms was 6,619,729 pounds with a value of $2,470,096 or 37 cents per pound. These dyes were made almost entirely from intermediates imported chiefly from Germany. The average price of all dyes sold in 1921 was 83 cents per pound, compared with $1.08 in 1920 and $1.26 for 1917.

As was stated under "Intermediates," the greatly reduced output of 1921 may be accounted for by (1) loss of most of our export trade, (2) the large stocks carried over from the previous year, and (3) the general business depression.

Indigo constituted 17 per cent of the total output in 1921, Sulphur Black 20 per cent, and Agalma Black 10 B, 3.7 per cent. These three dyes made up 40.8 per cent of the total quantity produced. In general, each class of dyes (according to method of application) showed large reductions in production. The progress of the year included the manufacture for the first time in this country of a considerable number of colors of greater complexity and more specialized application. The development of these products is a technical achievement, highly creditable to the industry. Many of these new products were among the more important colors not heretofore manufactured in the United States and the domestic production of these products is an important step toward a self-contained industry. This progress has continued in the spring of 1922 and production of new dyes has been reported in the first six months of the latter year. The domestic dye industry is still somewhat deficient, however, in the manufacture of vat dyes, alizarins, and certain special types.

The relation of production to consumption.—The imports of dyes during 1921 totaled 3,914,036 pounds with a value of $5,156,779. This quantity is 10 per cent of the total production and 8.2 per cent of the total sales of dyes for the same year. During 1921 the domestic exports of "aniline dyes" amounted to $5,067,000 in value and the exports of "all other dyes and dyestuffs" (a large part of which were undoubtedly coal-tar dyes) amounted to $1,203,155. The export of "aniline dyes" was 16 per cent of the value of the domestic production and the combined exports of "aniline dyes" and "all other dyes and dyestuffs" were 19 per cent of the domestic output. The tariff act of September 8, 1916, provided that unless by September 8, 1921, the domestic industry should produce 60 per cent of the value of the domestic consumption, the specific duties on dyes should no longer be assessed. In any event, the specific duties, beginning at said date, were to be annually reduced by 20 per cent until such duties should no longer be assessed. The portion of the tariff act of September 8, 1916, relating to these specific duties reads as follows:

"During the period of five years beginning five years after the passage of this act such special duties shall be annually reduced by 20 per cent of the rate imposed by this section, so that at the end of such period such special duties shall no longer be assessed, levied, or collected; but if, at the expiration of five years from the date of the passage of this act, the President finds that there is not being manufactured or produced within the United States as much as 60 per cent in value of the domestic consumption of the articles men-

tioned in Groups II (intermediates) and III (dyes and other finished products) of section 500, he shall by proclamation so declare, whereupon the special duties imposed by this section on such articles shall no longer be assessed, levied, or collected."

It is evident, however, that the law is not clear or definite as to whether this should be applied to individual dyes or to dyes taken as a group. For the purpose of analysis it will be assumed that it applies to dyes taken as a group and that domestic consumption is represented by production plus imports minus exports. On this basis of calculation the consumption of dyes during 1921 amounted to $32,466,992, if the exports of "aniline dyes" alone are taken into consideration; or to $31,263,853, if the exports include both "aniline dyes and all other dyes and dyestuffs" (see page 48 for explanation of exports of dyes). In the first case the domestic production of dyes of $32,377,213 would represent 100.4 per cent of the domestic consumption; in the latter case, 103.6 per cent of the total domestic consumption.

The United States Tariff Commission, in conformity with the President's request of October 27, 1917, to ascertain the facts on which to base executive action under this provision of the law, sent the following letter to the President on August 19, 1922:

The PRESIDENT:

Title V of the act of September 8, 1916, entitled "An act to increase revenue and for other purposes," imposing duties on dyes and other chemical coal-tar products, contains the following provision in section 501:

"During the period of five years beginning five years after the passage of this act, such special duties shall be annually reduced by 20 per centum of the rate imposed by this section, so that at the end of such period such special duties shall no longer be assessed, levied, or collected; but if, at the expiration of five years from the date of the passage of this act, the President finds that there is not being manufactured or produced within the United States as much as 60 per centum in value of the domestic consumption of the articles mentioned in Groups II and III of section 500, he shall by proclamation so declare, whereupon the special duties imposed by this section on such articles shall no longer be assessed, levied, or collected."

On October 27, 1917, the President requested the Tariff Commission to ascertain the facts on which to base executive action under this provision of the law. The Tariff Commission has therefore made a careful study of the progress of the American industry by taking a census of the production of dyes and other coal-tar products each year from 1917 to 1920, inclusive, together with a detailed analysis of imports during 1919 and 1920. A report is inclosed which shows the status of the domestic industry for the calendar year 1920.

The production of the articles provided for in Group II (coal-tar intermediates) of the act referred to above, in the United States during the calendar year 1920, amounted to $95,291,686, whereas during the same period the imports of these articles had a value of only $751,448, or less than 1 per cent of the value of the American production. The production in the United States during 1920 of the articles provided for in Group III (dyes and other finished coal-tar chemicals) amounted to $112,165,865 in value, whereas the imports of these articles during the same period amounted to $5,804,905, a little more than 5 per cent of the American production. Furthermore, during 1920 exports of aniline dyes amounted to $22,450,480 and exports of "all other dyes" consisting in part of synthetic dyes of coal-tar origin amounted to $7,373,111. It is, therefore, clear that during 1920 the domestic production of the articles enumerated in Groups II and III was much in excess of 60 per cent of the domestic consumption. Although complete statistical evidence as to production is not available for any later period than the calendar year 1920, it is apparent that the importation of these products has not increased during 1921 to such an extent that at the present time less than 60 per cent in value of the domestic consumption is supplied by domestic production. The facts, therefore, do not call for the issuance of a proclamation removing the specific duties under section 501 of said act.

Respectfully,

THOMAS WALKER PAGE, *Chairman.*

On February 9, 1922, customs officers were instructed by the Treasury Department to continue to assess specific duties at the rates of 2½ cents per pound and 5 cents per pound under the provisions of section 501 of the revenue act of 1916, leaving to final decision upon protest the question whether the first reduction of duty became effective in 1921 or in 1922. (T. D. 39007.)

In a decision by the Board of General Appraisers on April 25, 1922, an importation of imitation amber composed of synthetic phenolic resin, which was withdrawn from warehouse between September 30, 1921, and December 7, 1921, was held to be entitled to a reduction of 20 per cent on the special duty of 5 cents per pound imposed in section 501 of the revenue act of 1916. (G. A. 8523, T. D. 39093.)

Production of Dyes by Classes.

The dyes produced in the United States during 1921 have been classified according to method of application under the following classes: (1) Acid dyes, (2) basic dyes, (3) direct dyes, (4) lake and spirit soluble dyes, (5) mordant or chrome dyes, (6) sulfur dyes, (7) vat dyes, subdivided into indigo and other vats, and (8) unclassified dyes. While in certain cases, the classification of a color in one or two classes is arbitrary, because a dye may have properties which permit of its application by more than one method, it is believed that the above classifications facilitate the interpretation and comparison of production and import figures.

The production of dyes in the United States from 1917 to 1921, inclusive, and imports during the fiscal year 1914 and the calendar years 1920 and 1921 are arranged according to the above classes in Table 9, and they are also shown graphically in Figure 1.

ACID DYES.

Description.—The acid dyes are commonly dyed in an acid bath, they have acid properties and are usually sodium salts of a color acid. They constitute the most important group used in wool dyeing; they have, in addition, considerable application on silk. With few exceptions, they are little used on cotton or linen on account of their lack of affinity for vegetable fibers. The acid dyes are of value in the dyeing of jute. On wool they are used in dyeing suitings, dress goods, knitting, hosiery, carpet yarns, and hat materials, their great use being confined to goods not requiring repeated washings.

In general, acid dyes yield clear, bright shades, superior to the direct and mordant dyes in purity of shade, but are not equal to basic dyes in this respect. They have a wide color range, and vary greatly in both fastness and cost. In fastness, the acid colors show great individual variation; as a rule they are fair to light and acids, but have a tendency to bleed in washing. On wool they yield faster shades than on silk. Some of the more complex acid dyes produce shades of good general fastness. A considerable part of this group includes the lowest priced dyes produced. Their method of application in an acid bath is simple and of low labor cost.

The line of demarcation between acid dyes and certain colors of the direct and mordant groups, is arbitrary. Certain acid dyes may

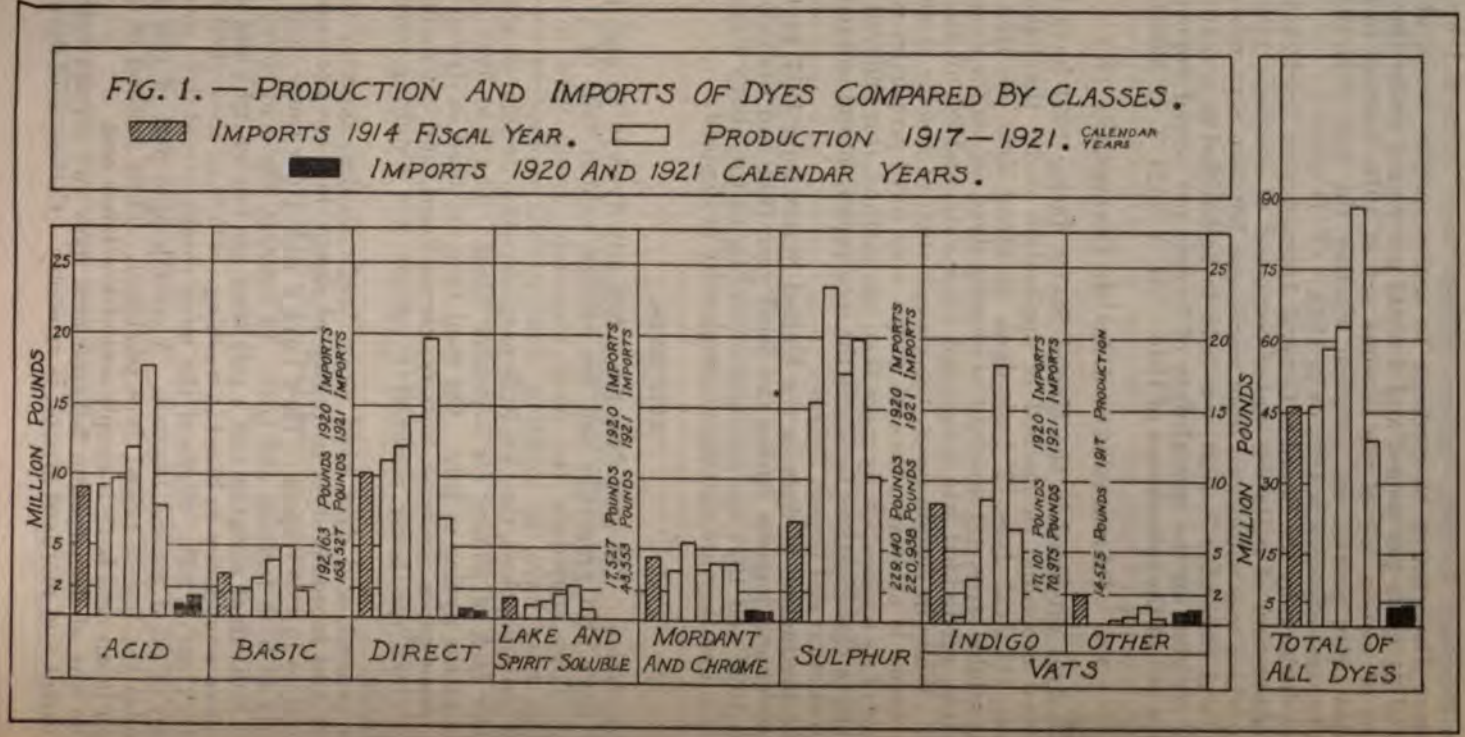


FIG. 1.—PRODUCTION AND IMPORTS OF DYES COMPARED BY CLASSES.
IMPORTS 1914 FISCAL YEAR.
PRODUCTION 1917—1921. CALENDAR YEARS
IMPORTS 1920 AND 1921 CALENDAR YEARS.
MILLION POUNDS
25
20
15
10
5
2
ACID
BASIC
192,163 POUNDS 1920 IMPORTS
168,327 POUNDS 1921 IMPORTS
DIRECT
LAKE AND SPIRIT SOLUBLE
17,527 POUNDS 1920 IMPORTS
43,553 POUNDS 1921 IMPORTS
MORDANT AND CHROME
SULPHUR
228,140 POUNDS 1920 IMPORTS
220,938 POUNDS 1921 IMPORTS
INDIGO
171,101 POUNDS 1920 IMPORTS
78,975 POUNDS 1921 IMPORTS
OTHER VATS
14,525 POUNDS 1917 PRODUCTION
MILLION POUNDS
90
75
60
45
30
15
5
TOTAL OF ALL DYES

be "after treated" with sodium or potassium dichromate, thereby yielding shades of good fastness to milling, light, washing, and other agents. These dyes, known as acid chrome colors, are used mostly on wool and are important for shades fast to milling on loose wool yarns and piece goods, particularly men's suitings. Most of the acid dyes are chemically included in one of the following groups: (1) nitro compounds; (2) azo compounds; (3) sulfonated basic dyes (mostly triphenylmethane derivatives).

Production.—This class ranks second in quantity produced (sulfur dyes were first), totaling 7,843,009 pounds, or 20.1 per cent of the total output in 1921 as compared with 17,741,538 pounds in 1920. The 1921 imports of acid dyes were the highest of any class, namely, 1,455,823 pounds, or 34.24 per cent of the total importation and 18.5 per cent of the domestic output. In 1920 the imports of this class amounted to 733,405 pounds, and the pre-war import (1914, fiscal year) amounted to 9,286,501 pounds.

The leading acid dyes from the standpoint of quantity produced include Agalma Black 10 B, Orange II, Nigrosine (water soluble), Indigo Extract, and Tartrazine. The production of Agalma Black 10 B was 1,426,194 pounds, a 45 per cent decrease from 1920; the sales exceeded the output by 261,617 pounds. This color made up 18 per cent of the acid dyes and 3.7 per cent of the total dyes produced during 1921. The output of Orange II was 922,326 pounds; that of Nigrosine (water soluble) was 626,706 pounds, a 77 per cent decrease from last year; the sales (846,537 pounds), however, exceeded the production. Indigo Extract, with a production of 585,931 pounds, showed a 58 per cent decrease from that of last year; the sales totaled 723,025 pounds. Tartrazine had an output of 559,134 pounds, a 20 per cent decrease from that of 1920. These five colors have been produced in large quantities since 1917 and the yearly production of each has exceeded the imports of 1914.

Sulphoncyanine G had an output in 1921 of 365,998 pounds, a considerable reduction from that of 1920 when the figures could not be published. Azo Rubine had an output of 232,216 pounds, a 50 per cent decrease from that of 1920, and slightly greater than the 1914 imports. The production of Ponceau 2 R, a color showing a large annual output since 1917, amounted to 178,272 pounds and the sales were 248,059 pounds. Wool Green S was first produced in quantity in 1920, when the output was 212,362 pounds. The output in 1921 was 164,581 pounds, and the price receded from $4.99 per pound in 1920 to $1.88 per pound in 1921. Fast Red V R, Azo Yellow, Fast Red A, and Sulphon Acid Blue R were also produced in large quantities in 1921.

Important additions to this class were made in 1921, and further developments in the production of new acid colors were announced in the first six months of 1922, thus giving a more complete variety of acid dyes of domestic manufacture. New acid dyes reported in 1921 were Fast Light Yellow, Xylene Yellow, Azo Fuchsine B, Lanacyl Violet B, Acid Brown, Jet Black R, Biebrich Patent Black, Acid Anthracene Red, Patent Blue and Patent Blue A, Acid Violet 6 B N, and Quinoline Yellow. Many of these newly developed colors showed considerable importation during 1921. The production of these colors in this country is an important development.

Among the more important acid dyes consumed in the United States during 1921, for which no production was reported in that year, are Alizarin Direct Green G (produced in this country in 1922), Wool Blue R L, Alizarin Astrol, Fast Green, Erio Chrome Azurol, Xylene Blue V S, and Cloth Fast Blue.

SULFUR DYES.

Description.—This group of dyes is used almost entirely in cotton dyeing, principally for heavy, deep shades, such as blues, greens, browns, and blacks. Sulfur colors are also used in the dyeing of linen and artificial silk. They are of great importance in cotton dyeing for uniform cloths, hosiery, gingham yarns, and cotton warps to be woven with wool and later dyed with acid dyes. The greatly extended use of sulfur dyes during the war served to increase permanently their application in cotton dyeing.

As a class, the sulfur dyes possess excellent fastness to washing, fulling, alkalies, and acids in cross dyeing. With some exceptions, their fastness to light is good. As they are not fast to chlorine, they do not withstand the repeated bleaching action of hypochlorites in the modern laundry treatment. They are applied in a sodium sulfide solution; the dyeings are after treated in certain cases with metallic salts to improve their fastness. The first dye discovered in this group, "Cachou de Laval," was made by the fusion of sawdust with sodium sulfide and sulfur in 1867. They are now prepared by the fusion of various intermediates (containing the nitro, amino, or imino groups) with sodium sulfide and sulfur. The sulfur dyes are not pure, distinct compounds, and the presence of other substances render them of comparatively low color value. Recent developments, however, have greatly increased the tinctorial value and range of shade of many of these dyes.

Production.—This class, since 1917, has led in quantity produced. The 1921 output was 10,239,255 pounds, or 26.25 per cent of the total production. The domestic output has in each of the five years since 1917 exceeded the pre-war imports of 1914. The manufacture of these colors is exceptionally well developed in the United States as is indicated by the relatively small import of 220,938 pounds during 1921, constituting 5.2 per cent of the total coal-tar dye importations.

Since 1917, with the exception of 1920, when Indigo led, Sulphur Black has been produced in the largest quantity. In 1921 the output was 7,832,696 pounds, and the sales 9,277,525 pounds, valued at $2,156,525. The price of this color receded from 60 cents per pound in 1917 to 23 cents in 1921, and on May 1, 1922, it sold for 18 cents per pound.

The output of sulfur browns totaled 1,159,115 pounds, with sales of 997,581 pounds, valued at $384,366. This was slightly in excess of 1920. The production of sulfur blues was 190,621 pounds, and the sales, due to the stocks carried over from the previous year's production, amounted to 544,931 pounds, valued at $351,424. The output of Sulphur Maroon increased from 133,407 pounds in 1920 to 230,773 pounds in 1921. Several new sulfur greens, blues, and yellows were first produced in the United States in 1921. The five largest sulfur dyes imported were: Cross Dye Green, 51,074 pounds

(this color gives a green of great clearness); Thionol Yellow, 35,240 pounds; Thionol Brown, 20,632 pounds; Eclipse Brown, 21,248 pounds; and Thionol Green D Y, 16,600 pounds. With the exception of Eclipse Brown, which is a Swiss color, these dyes were of English manufacture.

VAT DYES.

Description.—This class of dyes, on account of their exceptional fastness, variety, and beauty of shade, is of special importance for cotton goods, where laundry-fast dyes are necessary. They are used on both dyed and printed shirtings, blouse material, dress goods, ginghams, muslin curtains, and other cotton wash goods. On account of their high cost, they are used largely for colored stripes or small printed patterns on white fabrics, and have comparatively limited use for solid or heavy shades. They possess technical advantages in application over the alizarin mordant dyes. Vat dyes are used to some extent on silk, but have, with a few exceptions, small application on wool, chiefly on account of the injurious action of the alkaline dye bath.

The vat dyes as a class possess exceptional fastness to light, washing, acids, alkalies, and in most cases to chlorine. Certain vat dyes possess good fastness to only a part of these agents. No other class of dyes possesses a corresponding fastness to chlorine. The use of vat dyes is increasing, and they promise to be of greater importance in the cotton dyeing and printing industry as their comparatively high cost is reduced. The vat dyes are insoluble in water. They are applied by reducing in an alkaline solution (with hydrosulfite) to a soluble form which is taken up by the fiber and is subsequently converted to the original insoluble form by exposure to air. The term "vat" originated from the fact that these dyes are applied in a relatively large volume of water at about 120° F., whereas most other dyes are applied with a small volume of water at a higher temperature. The old indigo dye bath was known as a vat.

Vat dyes are of recent origin, except indigo, which is one of the oldest dyes known. They are difficult to manufacture, of relatively high cost, and are among the most complex dyes manufactured. Chemically, they are divided into indigoids (including thioindigoids), anthraquinone derivatives, and the carbazole derivatives. Members of each of these classes were made in the United States during 1921, with the exception of the thioindigoids, which include scarlets and reds.

Production.—The total production in 1921 of "vat dyes, including indigo," was 7,019,120 pounds, compared with 19,338,099 pounds for 1920. The output of indigo alone for 1921 was 6,673,968 pounds as against 18,178,231 pounds for 1920, when this country enjoyed a large export trade in this dye. The 1921 sales of indigo exceeded the production, totaling 9,413,308 pounds, with a value of $4,257,572. The production of indigo in 1921 was 17 per cent of the total output of dyes during that year. The 1914 importation of indigo was 8,507,359 pounds. During that year our total consumption was imported, as indigo was not commercially produced in the United States previous to the war. The price of domestic indigo in 1917 was $1.42 a pound and in 1921, 45 cents. The selling price for May 1, 1922, showed further reduction to 30 cents per pound. The pre-war (fiscal year

1914) invoice price was 13 cents per pound; this does not represent the cost to the consumer, as the profits of the importer must be added to this figure.

The production of vat dyes, other than indigo, in 1921 was 345,152 pounds, a 70 per cent decrease from 1920. The chief cause of the large domestic decrease in output was the great reduction in output of the brom indigos, which were produced in the previous year in large amounts, partly for the export trade. Indanthrene Blue G C D is the most important vat dye, other than indigo, and led in quantity produced, showing a considerable increase in output over the previous year. Indanthrene Dark Blue B O ranked second in quantity produced, with a large increase over the previous year. The production figures can not be published without revealing the operations of individual manufacturers. The production of Indanthrene Yellow, Brown B, and Green B decreased from that of the previous year.

In 1921 the total imports of vat dyes, other than indigo, was 1,045,370 pounds, compared with a domestic production of 345,152 pounds. This class represents the most conspicuous deficit in the domestic manufacturing program. They are complex and difficult to manufacture, as the investment for equipment is high and the profit is relatively small. Although in 1914 this class made up only 4.2 per cent of the imports, these dyes are nevertheless indispensable to the textile trade for fast shades on cotton. They were naturally left to the last in the domestic program, on account of their high cost and small consumption. While the domestic production is not adequate, it is believed that the technical developments during the last year place the manufacturers in a better position for rapid expansion.

In January, 1922, a new vat dye, Indanthrene Blue B C S, was imported. This is very similar to Indanthrene Blue G C D in its general properties, offering, however, a better fastness to chlorine. Within five months of the first importation of this dye two domestic manufacturers had conducted research and were manufacturing it on a commercial scale. Their capacity in May, 1922, indicates that they can soon meet domestic requirements. This achievement shows that domestic producers can meet the technical problems in the production of this class of dyes.

Production of Algol Yellow W G and Algol Red R was reported for the first time in 1921. With the exception of the latter color, there has been no domestic production of the vat pinks, scarlets, and reds. It is reported, however, that the experimental and semi-manufacturing scale work has been completed on vat pinks and that the manufacturer is ready to produce them on a commercial scale in case conditions are favorable.

The first nine vat dyes in order of quantity imported are: Indanthrene Blue G C D (single strength), 201,835 pounds; Hydron Blue (single strength), 146,072 pounds; Ciba Blue 2 B, 99,937 pounds; Indigo (20 per cent paste), 70,975 pounds; Indanthrene Golden Orange R, 56,390 pounds; Indanthrene Violet 2 R, 52,083 pounds; Indanthrene Yellow, 49,609 pounds; Indanthrene Golden Orange G (single strength), 33,423 pounds; Helindone Pink (paste), 31,813 pounds.

DIRECT COTTON DYES.

Description.—The direct or substantive dyes were introduced within the past 25 years. Their method of application is simple, as they dye vegetable fibers full shades in a neutral or alkaline bath, "directly," without the use of mordants. The greatest application of this class of dyes is on cotton, in addition they are used on linen, silk, paper, and wool. Direct dyes are of special value in dyeing fabrics containing both cotton and wool (union goods) or silk and cotton. The use of this class of colors on wool is gradually increasing, especially for knitting, worsted and shoddy yarns and loose wool.

The fastness of the individual dyes of this group shows a wide variation. On account of their high solubility they have a tendency to run when washed. Many direct dyes, particularly those first introduced, are sensitive to acids and fade on exposure to sunlight; others, especially the newer direct dyes, have good fastness to both acids and light and other agents. Certain direct colors are of good fastness, particularly to washing, following a treatment on the dyed fiber by "coupling" with certain intermediates. An after treatment with metallic salts or formaldehyde also improves the fastness of certain direct dyes. These "developed" direct dyes were not available in the early part of the war, and the use of the ordinary direct dyes by the hosiery dyers was a cause of much dissatisfaction on the part of the consumer. Developed blacks, such as Zambezi Black V, are now manufactured in this country for this purpose.

With a few exceptions the direct dyes are chemically "azo" compounds and are nearly all derivatives of benzidine, tolidine, diamino stilbene, or a group closely approximating one of these. A small but valuable group of direct colors belong in the thiazol class.

Production.—Direct dyes rank third in quantity of output, totaling in 1921 7,053,761 pounds, or 18.08 per cent of the total dyes manufactured in that year. In 1920 this class totaled 19,882,631 pounds, or 22.5 per cent of the total dyes produced. The imports of direct dyes in 1921 amounted to 537,664 pounds, or 12.6 per cent of the total quantity of dyes imported. The imports of this class in a prewar year (1914 fiscal) were 10,264,757 pounds, or 22.3 per cent of the total. Significant progress was made in this class in the production of new direct colors not heretofore reported. The domestic program is still lacking in the production of certain "developed" direct dyes.

The largest direct dye in quantity produced and value of sales was Direct Deep Black EW. The output in 1921 was 2,229,842 pounds, and the sales were 4,073,425 pounds, valued at $3,225,152, or an average value of 79 cents per pound. The 1921 output represents a 71 per cent decrease from that of 1920. This color made up 5.7 per cent of all the dyes produced in 1921 and 31.6 per cent of the production of direct cotton dyes. Imports of this type in 1914 were 1,246,536 pounds, and in 1921, 11,102 pounds were imported. Benzo Blue 2B ranked second with an output of 571,217 pounds, a 68 per cent decrease from last year. The sales in 1921 were 803,548 pounds, with a value of $557,457. The output of this color has ranged from 1,380,335 to 1,789,774 pounds per year in the period 1917 to 1920.

Benzamine Brown 3 GO ranked third in quantity of output—491,347 pounds—and the sales were 544,933 pounds, valued at $624,377. Erie Direct Black RX with a production of 298,516 pounds

ranked fourth in this class. The sales totaled 335,508 pounds valued at $239,572. This dye was first reported in 1919. In 1920 it showed the largest increase of any individual dye except Indigo, the production totaling 2,050,741 pounds in that year, when it was exported in large amounts.

Other important direct dyes showing a large output included Oxamine Black BHN, output 281,852, sales 485,241 pounds, valued at $720,350; Congo Brown G, output 213,403 pounds. During 1920 Congo Red was exported in large amounts to India, and our production during that year amounted to 1,502,630 pounds. In 1921, however, with a loss of most of this export trade, the production declined to 207,655 pounds, a decrease of 86 per cent from that of 1920. The dyes Oxamine Green B and Direct Yellow R were each produced in excess of 153,000 pounds.

Among the new direct cotton dyes first reported in 1921 were Benzo Fast Scarlet 4BS, 8BS, GS, which were reported in considerable quantity; Benzo Fast Yellow 5GL, Benzo Fast Pink 2BL, Diamine Black RO, Benzo Cyanine R, Diamine Black RO, Oxamine Blue B, Oxamine Copper Blue RRX, Oxamine Light Green G, Benzo Fast Black L, Benzo Fast Gray, Diamine Bordeaux B.

The six most important direct cotton dyes in quantity imported in 1921 were Trisulphon Brown, 38,558 pounds; Trisulphon Brown GG, 22,872 pounds; Diaminogen Blue, 17,308 pounds; Chicago Blue 6B, 13,788 pounds; Diamine Scarlet, 12,399 pounds; Direct Deep Black, 11,102 pounds; Benzo Fast Scarlet, 10,973 pounds.

MORDANT AND CHROME DYES.

Description.—These colors dye both vegetable and animal fibers in conjunction with metallic mordants, such as salts of chromium, aluminum, iron, and tin. The resulting shades are, in general, of exceptional fastness to color-destroying agents. The mordant dyes yield on wool the fastest shades to light, washing, and other agents. They are also important in textile printing, particularly on cotton piece goods. This class is of relatively small importance on silk.

The mordant dyes are frequently designated as chrome colors. As many of these colors were derived from alizarin, they were formerly called alizarin dyes. The true alizarins are used mostly with a mordant; some of the new alizarin dyes can be used with or without a mordant; the latter are known as acid alizarins. In the application of chrome dyes on wool, the mordant may be applied before, during, or after the dyeing operation. There is little differentiation between some acid, acid chrome, and chrome colors, as certain dyes may be applied by either of two nethods. The labor cost of dyeing with this class is higher than for other groups.

The most important dye of this class, alizarin, is used in the production of the well-known Turkey red on cotton. This is one of the oldest dyed shades which was produced in ancient times by the use of madder root. For about 50 years alizarin has been prepared synthetically from anthracene.

Chemically, the mordant dyes include members of the following chemical classes: (1) Anthracene, (2) azo, (3) oxazine, (4) triphenylmethane, (5) nitroso, (6) oxyquinone, and (7) xanthone.

Production.—The production of this class in 1921 was 3,997,442 pounds or 10.25 per cent of the total quantity of dyes manufactured

n that year. This quantity is a 2.5 per cent increase from that of 1920. The 1921 imports of this class were 695,961 pounds or 16.36 per cent of the total quantity of dyes imported. This importation, however, represents a comparatively large percentage, namely 17 per cent, of the quantity of this class produced. During the pre-war year, 1914, 4,450,442 pounds of this class were imported, or 9.7 per cent of the total importation. The quantity and variety of the mordant and chrome dyes manufactured in the United States is still insufficient for the normal needs of the textile trade. Definite and encouraging progress was made, however, in 1921 in the manufacture of dyes of this class. Many colors of this group are not identified, as they are not included in the Schultz tables and are consequently included only in the grand totals.

Salicine Black U led in quantity produced with an output of 1,523,220 pounds and a sales of 1,426,550 pounds, with a value of $1,073,119 or 75 cents per pound. This color was fourth in quantity of all dyes manufactured in 1921, and made up 38 per cent of the total quantity of mordant and chrome dyes. The production of 1921 represents a 42 per cent increase from that of 1920. Metachrome Brown B was second of this group in quantity produced, with an output of 474,128 pounds, an increase of 145 per cent over that of the previous year. Alizarin Yellow G ranks third, with a production of 271,285 pounds, a 28 per cent increase over the production of 1920. In 1918 the output of this color reached 2,233,208 pounds, the maximum for any year, when it was in demand for dyeing Army woolen uniforms. The production of Gallocyanine was 140,064 pounds in 1921. The maximum output of this color was in 1917, when it was used in large amounts for dyeing Navy uniform cloth.

Other mordant or chrome dyes showing a large production include Alizarin Yellow R, Palatine Chrome Brown, diamond blacks, Mordant Yellow, and Alizarin Brown. Alizarin, with domestic sales of 34,236 pounds and an import of 136,283 pounds, is one of the essential dyes of this group not yet produced in sufficient amounts for domestic requirements. This color, in addition to its use as a dye, serves also as an intermediate for the production of certain other dyes not yet manufactured in this country in adequate quantities. New dyes of the mordant and chrome class reported for the first time include Cloth Red 3 G, Cloth Red G, Diamond Green, and several colors not listed in Schultz tables.

Individual dyes of this group were among the largest importations of dyes during 1921. The imports of four mordant and chrome colors amounted to nearly 600,000 pounds. The six largest colors of this class imported are Erio Chrome Black A, 224,002 pounds, the largest import of any individual dye; Alizarin, 136,283 pounds, ranking fourth in quantity of all dyes imported; Erio Chrome Black T, 132,388 pounds; Anthracene Blue WR, 107,769 pounds; Alizarin Blue Black, 43,277 pounds; and Erio Chrome Blue Black 38,226 pounds.

BASIC DYES.

Description.—The basic dyes are characterized by their depth, brilliancy of shade, and purity of tone, surpassing all other classes of dyes in these respects. They possess high tinctorial power, but as a class lack fastness, especially to light and washing. Basic colors are

used on cotton in dyeing and printing, where bright shades or col tints are desired without special requirements for fastness.

The basic dyes are used in the dyeing of paper and jute and also fo lithographic inks, typewriter ribbons, copy paper, and pencils. Thes colors have little application on wool, with the exception of rhoda mine B and a few others. Basic dyes are chemically basic in characte and are fixed on vegetable fibers with an acid mordant, namely tannic acid.

This class is historically the oldest of the coal-tar dyes. Mauvin or Perkin violet, discovered by W. H. Perkin in 1856, was the firs aniline dyestuff produced on a commercial scale. Basic dyes are no at present as important as formerly. This is due to a considerabl extent to the replacement of these colors for cotton dyeing by direc dyes and sulphur dyes, both of which have advantages in economy application and in many cases possess better fastness. In wo dyeing the acid dyes have almost entirely displaced the basic color Chemically, the basic dyes include a large number of the tripheny methane derivatives, and, in addition, members of the followin chemical classes: (1) Azines, (2) azos, (3) thioazines, (4) thioazol and (5) acridines.

Production.—As shown in Table 8, the output of this class in 192 totaled 1,853,094 pounds compared with 4,993,001 pounds for 192 when a number of dyes of this class were exported in quantity. Th manufacture of dyes of this class is well developed in this countr as is seen by a comparison of the imports and production. Th imports of basic dyes in 1921 were 163,527 pounds or 3.84 per cent the total quantity of coal-tar dyes imported. This importatio constituted 8.8 per cent of the total production of this class in 192 The importation of basic dyes in 1914 was 3,002,480 pounds.

Bismark Brown 2R, with a production of 557,753 pounds, led th group in quantity produced; the sales were 517,065 pounds with value of $439,614. Both sales and production in 1921 exceeded th output of 1920. Chrysoidine Y, with an output of 253,693 pound ranks second in this class; the sales were 343,872 pounds, valued $263,521. The 1921 production represents a 57 per cent decrea from that of the previous year.

The production of Methylene Blue, another important basic col was 209,395 pounds. Other basic dyes showing a large output i clude: Methyl Violet, 190,643 pounds; Chrysoidine R, 100,246 pound and Auramine, 94,484 pounds. The output of Magenta and Malachi Green showed large decreases, while that of Phosphene showed output of more than twenty times that of the previous year. The ne basic dyes, production of which was first reported in 1921, are Victor Blue R, Rhodamine 6 G, Methylene Violet, and New Fast Green 3 B

The first five basic dyes in order of quantity imported are: Aur mine, 35,532 pounds; Phosphene, 21,153 pounds; Victoria Blue B 12,342 pounds; Rhodamine B, 10,890 pounds; and Rhodamine 6 G 10,069 pounds. All of these dyes were produced in the United State during 1921.

COLOR LAKE AND SPIRIT-SOLUBLE DYES.

Description.—These dyes constitute one of the smaller groups The color lake dyes are used in the preparation of a class of pigment *known as* "color lakes," which are discussed in detail under tha *heading.*

The spirit-soluble dyes are insoluble in water, but dissolve in either oils, fats, or various organic solvents; hence, they find application for coloring varnishes (both spirit and oil), fats, oils, waxes, and similar products. Many of the spirit-soluble dyes by chemical treatment, such as sulfonation, are converted into water-soluble dyes used in textile dyeing, and from this point of view these products may be considered partly completed dyes.

Production.—The production of lake and spirit-soluble dyes in 1921 was 720,406 pounds, constituting 1.85 per cent of the entire output. The production of this class of dyes in 1920 was 2,205,281 pounds, when it made up 2.5 per cent of the total.

The imports of this class during 1921 were 43,553 pounds and during the previous year 17,527 pounds.

FOOD DYES.

Description.—These dyes, used for coloring food and food products, include a limited list of selected dyes which meet specifications of the Bureau of Chemistry for purity. The total production of these colors in 1921, the first year that these products were separately compiled, was 50,709 pounds. The average value of sales during that year was $5.80 per pound.

IMPORTANT DYES IMPORTED.

Table 9 shows a comparison of the dyes of each class imported in the largest quantity during 1914 and 1921, with the domestic production for 1921 in case the figures can be published. This gives an indication of the more important requirements of the domestic consumer not adequately met by the domestic dye manufacturer.

TABLE 9.—*Comparison of dyes imported in largest quantity, 1914 and 1921, with domestic production, 1921, by classes.*

Schultz No.	Class and name of dye.	1921		1914
		Production.	Imports.	Imports.
	ACID DYES.	*Pounds.*	*Pounds.*	*Pounds.*
.....	Wool blue R L	.....	69,719	.....
22	Xylene light yellow	(1)	60,422	23,074
257	Sulphocyanine	365,998	51,989	145,694
366	Wool green S	164,581	51,822	60,073
543	Patent blue	(1)	42,718	196,228
23	Tartrazine	559,134	38,395	270,477
865	Alizarin direct green G	.....	35,534	2,000
858	Alizarin saphirol B	(1)	28,606	.....
.....	Cloth fast blue	.....	23,782	3,796
19	Fast light yellow	(1)	23,375	38,908
623	Fast green	.....	22,619	14,347
856	Alizarin astrol	.....	22,562	10,917
613	Quinoline yellow	(1)	21,898	15,354
	BASIC DYES.			
692	Auramine	94,484	35,532	449,276
606	Phosphine	(1)	21,153	168,225
559	Victoria blue B	(1)	12,342	127,769
573	Rhodamine B	(1)	10,890	59,354
571	Rhodamine 6 G	(1)	10,099	37,515
705	Indamine 6 B	.....	9,946	66,170
618	Thioflavine T	.....	7,297	35,224
512	Magenta	49,797	7,110	87,102

[1] Production in the United States, but figures not publishable.

TABLE 9.—*Comparison of dyes imported in largest quantity, 1914 and 1921, with domestic production, 1921, by classes*—Continued.

Schultz No.	Class and name of dye.	1921		1914
		Production.	Imports.	Imports.
	DIRECT DYES.	*Pounds.*	*Pounds.*	*Pounds.*
449	Trisulphon brown		38,558	16,783
457	Trisulphon brown G G		22,872	7,562
273	Diaminogen blue		17,308	8,398
424	Chicago blue 6 B	83,781	13,788	118,542
319	Diamine scarlet		12,399	41,175
462	Direct deep black	2,229,842	11,102	1,246,596
279	Benzo fast scarlet	(1)	10,973	36,674
451	Congo fast blue		9,259	4,449
274	Diaminogen		7,864	313,629
342	Chrysamine	13,328	7,815	608
	MORDANT AND CHROME DYES.			
184	Erio Chrome black A		224,002	96,578
778	Alizarin, synthetic	(1)	136,283	202,392
183	Erio Chrome black T	(1)	132,388	129,556
789	Anthracene blue W R	(1)	107,769	107,773
862	Alizarin blue black		43,277	54,706
180	Erio Chrome blue black	(1)	38,226	57,006
774	Alizarin black		26,524	205,438
804	Alizarin blue		21,521	98,327
782	Alizarin brown	59,613	20,700	115,589
785	Alizarin R G, G I		18,266	49,052
780	Alizarin red		15,565	81,922
637	Gallamine blue		15,179	2,756
	SULFUR DYES.			
.....	Cross dye green		51,074	140
.....	Thionol yellow		35,240	.....
.....	Eclipse brown		21,248	4,359
.....	Thionol brown		20,632	.....
.....	Thionol green D Y		16,600	.....
726	Pyrogene blue		11,718	10,962
.....	Thionine green G G		9,797	.....
746	Katigene green		6,543	63,992
	VAT DYES.			
842	Indanthrene blue GCD (single strength)	(1)	201,835	478,538
748	Hydron blue		146,072	296,272
881	Ciba blue 2 B		99,937	16,582
874	Indigo, synthetic	6,673,968	70,975	8,807,334
761	Indanthrene golden orange R		56,390	50,440
767	Indanthrene violet RR	(1)	52,083	68,461
849	Indanthrene yellow	(1)	49,609	75,314
760	Indanthrene golden orange G		33,423	20,098
910	Helindone pink		31,813	41,691
838	Indanthrene blue RS	(1)	28,908	187,337
873	Helindone brown AN		27,747	2,858
901	Ciba violet B		21,987	20,858
831	Indanthrene red BN		21,331	6,000
840	Indanthrene blue 3 G		19,715	6,112
918	Helindone red 3 B		17,566	27,858
819	Algol red RFF	(1)	14,489	2,338

[1] Production in the United States, but figures not publishable.

Domestic production of dyes in 1914.—Table 10 contains a list of those dyes produced in the United States in the calendar year 1914. Seven establishments, with a capital investment of $3,386,212, produced coal-tar colors totaling in quantity 6,619,729 pounds, with a value of $2,470,096.

The persons engaged in the manufacture numbered 528, being divided into salaried employees 130 and wage earners (average number) totaling 398. As already pointed out, the American industry in that year was confined almost entirely to the assembling into finished dyes (mostly azo) of intermediates imported from Europe, chiefly from Germany.

The names of the firms producing coal-tar dyes in that year are Schoellkopf Aniline & Chemical Works (Inc.), located at Buffalo

N. Y.; Heller & Merz, Newark, N. J.; The Bayer Co. (Inc.), with a plant at Rensselaer, N. Y.; W. Beckers Aniline & Chemical Works, located at Brooklyn, N. Y.; the Central Dyestuff Co., Newark, N. J.; the Consolidated Color & Chemical Co., also located at Newark, N. J.; and the Hub Dyestuff & Chemical Co., at South Boston, Mass.

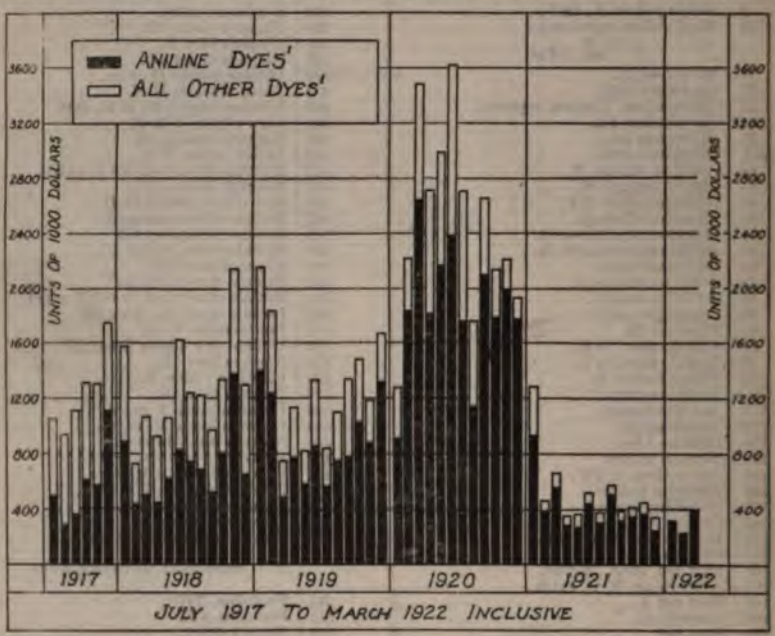
TABLE 10.—*Dyes produced in the United States in 1914.*

Schultz No	Name.	Schultz No.	Name.
	STILBENE AND PYRAZOLONE DYES.		AZO DYES—continued.
9	Direct yellow F, 2RF.	320	Bordeaux extra.
23	Wool yellow extra conc.	326	Niagara violet 2B.
	AZO DYES.	326	Niagara blue R.
31	Oil yellow A.	327	Niagara violet 3R.
32	Oil yellow 2625.	333	Diazine black, H extra.
33	Chrysoidine, Y extra, crystals.	333	Diazo black B H N.
34	Chrysoidine 3R.	336	Niagara blue G W, H W, R W.
36	Oil orange 2311.	337	Direct blue W B B.
36A	Oil yellow 2338.	337	Niagara blue B, 2B.
37	Croceine orange, Y.	342	Direct yellow W B.
38	Crystal orange 2G.	342	Buffalo direct yellow C G extra.
48	Alizarin yellow F F.	343	Niagara fast red F D.
58	Alizarin yellow R.	344	Erie direct brown 3RB.
64	Buffalo fast crimson G.	362	Buffalo direct orange R.
66	Buffalo fast crimson R.	363	Buffalo direct red 4B.
68	Oil yellow 2681.	375	Buffalo direct violet 4R.
70	Croceine orange R.	386	Niagara blue B R.
82	Xylidine scarlet.	392	Buffalo direct orange Y.
83	Cumidine scarlet.	394	Buffalo direct yellow C R R extra.
83	Ponceau 3R.	405	Buffalo direct cardinal 7B.
94	Buffalo flamine B.	410	Benzazurine W B.
95	Buffalo flamine G.	410	Buffalo direct blue G extra.
105	Sudan brown S.	424	Niagara blue 6B.
110	Buffalo rubine.	426	Direct sky blue B.
112	Azo Bordeaux.	426	Niagara blue 4B.
112	Bordeaux B.	436	Panama black R extra.
126	Indoine blue.	436	Panama black 3G extra.
134	Metanil yellow.	441	Niagara black blue R.
141	Azo yellow, A 5W.	462	Erie direct black G extra.
143	Resorcin yellow.	463	Erie direct black R extra.
144	Naphthol orange.	464	Erie direct green ET, WT.
145	Orange A, II.	474	Erie direct green MT.
147	Buffalo fast fuchsine B.	477	Erie direct brown G R, G B.
151	Orange R.	488	Erie direct brown R F, 2R F.
161	Fast red, conc., S conc.		
163	Azo ruhine, W B, extra.		TRIPHENYL-METHANE DYES.
166	Fast red A.	512	Fuchsine, TR.
168	Amaranth.	513	Fuchsine NB.
168	Fast red.	515	Methyl violet.
168	Wool red 40 F.	521	Spirit blue, red and green shades.
169	Brilliant scarlet 3R.	524	Acid magenta.
174	Scarlet.	536	Alkali blue, red and green shades.
188	Buffalo fast blue R.	537	Paper blue, red and green shades, 6G supra.
188	Acid fast blue S R.	537	Soluble blue.
189	Buffalo fast blue B.	538	Methyl blue.
189	Acid fast blue S B.	539	Acid blue.
211	Leather orange.		
211	Resorcin brown.		XANTHONE DYES.
217	Buffalo black N B.	587	Eosine.
217	Acid black 10B.	599	Chrome blue R, paste and powder.
220	Buffalo black P Y extra.		
223	Sudan III.		OXAZINE DYES.
227	Croceine scarlet M O O.		
262	Sudan IV.	626	Chrome blue B, paste and powder.
267	Buffalo cyanine R, 3R.		
261	Buffalo black 8B, 10B, R.		AZINES.
266	Buffalo black A D.		
268	Buffalo black E A.	679	Safranine Y extra.
269	Buffalo black 4B.	680	Safranine 6B.
272	Buffalo black 2B.	684	Brilliant safranine R.
275	Buffalo chrome black B W N.	697	Induline.
283	Bismarck brown, Y.	698	Nigrosine.
284	Bismarck brown 53.	698	Nigrosine, spirit soluble.
303	Brilliant yellow C.	699	Nigrosine from aniline (indulines).
307	Congo red 4B.	699	Induline.
311	Erie orange 2R.	700	Nigrosine, water soluble.
312	Buffalo direct garnet R.	700	Nigrosine from nitrobenzol.
313	Buffalo direct crimson B.		

The Export Trade in Dyes.

Exports from the United States.—The Commerce Department reports exports of domestic dyes and dyestuffs, which classification is further divided into three groups: (1) aniline dyes, (2) logwood extracts, (3) all other dyes and dyestuffs. The value for each of these three groups is reported previous to 1922. Under the third classification, all other dyes and dyestuffs, there may be reported both natural dyes other than logwood extract and coal-tar dyes.

FIG. 2.—VALUE OF DOMESTIC DYES EXPORTED BY MONTHS.



[1] The domestic exports of dyes, as shown by the Commerce Department, are divided into 3 groups—(1) aniline dyes, (2) logwood extract, and (3) all other dyestuffs.

The third classification may include both natural dyes (other than logwood extracts, shown separately), as well as coal-tar dyes. Since logwood extract, however, is the most important natural dye exported from the United States, it is reasonable to assume that a considerable portion of "all other dyes and dyestuffs" represents coal-tar dyes.

In 1922, however, the Commerce Department adopted a new classification. Coal-tar dyes were grouped under coal-tar finished products and were divided into (1) color lakes and (2) other colors, dyes and stains. For the first time the quantity, as well as the value of exports, were published.

Logwood extracts is by far the most important natural dye exported from the United States, and it is, therefore, reasonable to assume that a large part of all other dyes and dyestuffs represents coal-tar dyes. The most important natural dye included under Group 3 is quercitron and flavine, derived from the bark of the black oak (*Quercus velutina*). These domestic natural dyes have been exported in considerable amounts during the war and in smaller amounts before the war. In 1922, however, the Commerce Department adopted a new classification. Coal-tar dyes were grouped under coal-tar finished products and were divided into (1) color lakes and (2) other colors, dyes, and stains. For the first time the quantity, as well as the value of the exports, were published. Table 11 shows by months the total exports

of dyes from the United States, and this same information is shown graphically in Figure 2. The countries to which dyes are exported from the United States are shown in detail in Part V, appendix.

The combined value of the exports of aniline dyes and all other dyes for 1919, was $15,728,499, compared with $29,823,591, for 1920. In 1921 this figure showed a sharp decline to $6,270,155. In other words, the exports of domestic dyes for 1921 showed a decrease of 79 per cent, as compared with the exports of 1920. The total exports for 1917, one of the early years when the domestic industry was first expanding from its small pre-war stage, were valued at $7,548,963, which exceeds the exports of 1921. The total exports of aniline dyes for 1920 were valued at $22,450,480, compared with an export of $5,067,000 for 1921. The greatest export for any month in 1921 of aniline dyes was in January, $943,595, whereas the smallest export was for December, amounting to $254,878.

The combined value of the total exports of color lakes and other colors, dyes and stains of coal-tar origin for the first three months in 1922, was $973,316 compared with $2,432,764 for aniline dyes and all other dyes and dyestuffs for the first three months of the previous year. The annual export at the rate for the first three months of 1922 would equal in value about $3,900,000. In quantity the exports during the first three months of 1922 totaled 1,387,594 pounds. This great reduction in our export trade may be attributed in part to the general business depression, but the chief cause was the appearance of German dyes in the principal foreign markets, such as China, India, and Japan (see Dye imports of China, Japan, and India, p. 55).

As far back as 1919 the Tariff Commission pointed out in its Census of Dyes and Coal-Tar Chemicals for that year that any deductions as to the competitive strength of the domestic industry based on the large exports of 1919 and 1920 were not warranted, as the domestic producers during that period met little competition in foreign markets in German colors. Subsequent developments have borne out the accuracy of that statement, as indicated by the rapid decline in exports during 1921 and 1922.

TABLE 11.—*Domestic exports of dyes, by months, July, 1917, to March, 1922.*

Month.	1917			1918		
	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.
January				$893,760	$688,958	$1,582,718
February				441,704	297,278	738,982
March				552,285	526,400	1,078,685
April				453,326	479,428	932,754
May				626,204	447,898	1,074,102
June				828,801	797,403	1,626,204
July	$497,106	$576,579	$1,073,685	753,236	486,690	1,239,926
August	304,768	644,949	949,717	695,472	530,133	1,225,605
September	371,565	757,467	1,129,032	528,207	449,295	977,502
October	623,586	695,489	1,319,075	816,377	532,841	1,349,218
November	582,725	733,008	1,315,733	1,377,623	757,488	2,135,111
December	1,122,468	639,253	1,761,721	662,616	643,097	1,305,713
Total	3,502,218	4,046,745	7,548,963	8,629,611	6,636,909	15,266,520

[1]Commerce and Navigation lists under domestic exports of "dyes and dyestuffs"—"analine dye," "logwood extract," and "all other dyes and dyestuffs." Under this latter designation may be included both natural and coal-tar dyes. However, since logwood extract—shown separately—is the most important natural dye exported from the United States, it may be assumed that a considerable portion of the exports under "all other dyes and dyestuffs" are coal-tar dyes.

TABLE 11.—*Domestic exports of dyes, by months, July, 1917, to March, 1922*—Contd.

Month.	1919			1920		
	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.	Aniline dyes.	All other dyes.[1]	Total of aniline and all other.
January	$1,405,017	$755,382	$2,160,399	$917,574	$372,468	$1,290,042
February	1,231,355	617,050	1,848,405	1,850,662	379,825	2,230,487
March	492,291	278,591	770,882	2,648,615	850,695	3,499,310
April	777,123	359,512	1,136,635	1,829,771	891,467	2,721,238
May	585,970	239,744	825,714	2,180,606	817,713	2,998,319
June	858,661	475,571	1,334,232	2,389,515	1,239,191	3,628,706
July	574,274	267,425	841,699	1,770,780	947,411	2,718,192
August	761,009	350,491	1,111,500	1,151,196	623,181	1,774,377
September	785,497	557,005	1,342,502	2,114,915	551,113	2,666,028
October	1,037,708	453,390	1,491,098	1,802,142	334,167	2,136,309
November	887,710	300,041	1,187,751	2,006,534	211,465	2,217,999
December	1,327,456	350,226	1,677,682	1,788,170	154,415	1,942,585
Total	10,724,071	5,004,428	15,728,499	22,450,480	7,373,111	29,823,592

Month.	Aniline dyes.	All other dyes.[1]	Total aniline and other.
1921.			
January	$943,595	$349,114	$1,292,709
February	397,123	72,641	469,764
March	574,909	95,322	670,231
April	305,760	59,250	365,010
May	278,331	91,753	370,084
June	444,273	81,477	525,750
July	310,357	65,626	375,983
August	513,012	70,663	583,675
September	322,477	70,228	392,705
October	349,981	73,706	423,687
November	372,244	78,703	450,947
December	254,878	94,656	349,534
Total	5,067,000	1,203,139	6,270,139

Month.	Coal-tar dyes.					
	Color lakes.		Other colors, dyes, and stains.		Total color lakes and other.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1922.[2]	*Pounds.*		*Pounds.*		*Pounds.*	
January	5,059	$4,188	364,971	$325,048	370,030	$329,236
February	6,796	5,124	298,364	230,544	305,160	235,668
March	3,612	3,162	708,792	405,250	712,404	408,412
Total	15,467	12,474	1,372,127	960,842	1,387,594	973,316

[1] Commerce and Navigation lists under domestic exports of "dyes and dyestuffs"—"aniline dyes," "logwood extract," and "all other dyes and dyestuffs." Under this latter designation may be included both natural and coal-tar dyes. However, since logwood extract—shown separately—is the most important natural dye exported from the United States, it may be assumed that a considerable portion of the exports under "all other dyes and dyestuffs" are coal-tar dyes.

[2] In 1922 a new classification was adopted grouping these products under "Color lakes" and "Other colors, dyes and stains."

Exports from Germany.—The official statistics of the German Government show that the total exports of coal-tar dyes for 1913 were 239,598,133 pounds, with a value of $51,640,050. This export was subdivided as follows: (1) Aniline and other coal-tar dyes, 141,729,325 pounds, valued at $33,814,802; (2) alizarin, alizarin dyes, and dyes from anthracene, 24,338,784 pounds, valued at $5,134,374; and (3) indigo, 73,530,024 pounds, valued at $12,690,874.

Table 12 contains the exports of German dyes in 1913 by countries. An examination of this table shows that of the total exports of indigo, amounting to 73,530,024 pounds, China alone consumed 47,090,256 pounds, with a value of $6,396,964. This quantity is larger than the total consumption of all other nations, as China has been one of the largest consumers of indigo for many years. The United States ranked second in quantity of indigo imported from Germany, with a total of 7,630,121 pounds; Austria was third, receiving 3,000,461 pounds in 1913. The quantity imported to Great Britain was 2,601,428 pounds; to Dutch East Indies and other possessions, 2,103,188 pounds. Other nations receiving between one and two million pounds were Japan, Italy, and the Netherlands. Russia and Egypt both received slightly less than 1,000,000 pounds, followed by France and the British Indies and other possessions, which received slightly more than 700,000 pounds of indigo.

The total exports in 1913 of all alizarin, alizarin dyes, and dyes from anthracene was 24,338,784 pounds. The British Indies and other possessions were the largest consumers of this export, receiving 5,866,441 pounds. Great Britain ranked second, with 5,857,622 pounds, closely followed by the United States with a total of 5,855,418 pounds. The Dutch East Indies and other possessions received 1,298,509 pounds and Austria-Hungary 1,192,689 pounds. Russia and the Netherlands each received somewhat over 700,000 pounds, and Italy and France between four and five hundred thousand pounds each.

The total exports of aniline and other coal-tar dyes from Germany in 1913 was 141,729,325 pounds with a value of $33,814,802. The United States ranked first in quantity of this group of dyes received from Germany, with a total of 30,544,733 pounds, valued at $6,717,074; Great Britain ranked second, with 24,285,874 pounds, valued at $5,352,144; China was third, receiving 18,653,121 pounds, valued at $4,536,994; Austria-Hungary received 12,740,383 pounds; Italy, the British Indies, and Japan received from seven and seven-tenths to nine million pounds each. France, the Netherlands, and Russia each received from two and four-tenths million to slightly more than 3,000,000 pounds. Sweden, Switzerland, Spain, and Mexico each received from one and two-tenths to one and nine-tenths million pounds. Turkey, Canada, Norway, Denmark, and Finland consumed from one-half to one million pounds each.

China, with an import of all coal-tar dyes from Germany amounting to 65,743,377 pounds, was the largest individual consumer. The United States was second, receiving in that year 44,030,272 pounds. Great Britain received 32,744,924 pounds; Austria-Hungary, 16,933,533 pounds; the British Indies and other possessions, 15,008,917 pounds; and Japan, 9,539,305 pounds.

In 1920 Germany exported 56,000,000 pounds of dyes,[1] less than one-fourth of her 1913 export. She received for this quantity 195,000,000 gold marks as against 217,000,000 gold marks for her 1913 export, which totaled slightly less than 240,000,000 pounds. In other words, Germany received in 1920 for all dyes exported 90 per cent of the gold marks received for dyes exported in 1913, notwithstanding the fact that in 1920 she exported less than one-fourth the quantity of dyes exported in 1913.

[1] Verein zur Wahrung der Interessen der Chemischen Industrie, p. 37.

DYE IMPORTS OF CHINA, JAPAN, AND INDIA.

A comparison of the dye imports of India and Japan in the yea 1913 and the period 1919 to 1921 shows that Germany has re covered a large part of her former trade in coal-tar colors to Indi and Japan, and that the export trade in dyes from the United State to these countries, which reached its maximum in 1920, shows large reduction in 1921.

China.—The total direct gross import of synthetic indigo by China in 1913 was 42,646,256 pounds, valued at $7,038,137. The official statistics of the Chinese Government show that of this quan tity, 13,634,796 pounds came from Germany and 24,681,060 pound from Belgium, the latter probably being of German manufacture 2,358,399 pounds of indigo came from France, the quantity from al other countries totaling 1,930,266 pounds. In 1919 China had direct gross import of 2,512,399 pounds of indigo, with a value o $1,828,925. Of this quantity 1,246,400 pounds came from France 635,467 pounds from the United States. In 1920 the total direc gross import of indigo by China amounted to 20,813,328 pounds Of this total, the statistical report shows that 5,979,332 pounds cam from the United States, 3,334,532 pounds from Switzerland, an 2,917,199 pounds from France. The quantity from Germany wa 2,876,666 pounds compared with no import from that countr in the previous year. The import statistics of China are not avail able for 1921. It is understood, however, that the import of indigo from the United States in 1921 was greatly reduced.

According to official statistics of China, the direct gross import of aniline dyes in 1913 was valued at $3,961,962. Of this amount the value of the imports from Germany was $1,596,693, and $1,502,975 from Belgium. The latter were undoubtedly of German manufacture. In 1919 the direct gross imports were valued at $4,548,401; the value of the aniline dyes received from the United States was $2,318,090 and from Japan, $1,145,646. In 1920 the value of direct gross imports was $9,900,599. Of this amount the value of aniline dyes received from the United States was $2,543,185; from Germany, $1,519,967; from Japan, $1,352,793; while Belgium, the Netherlands, and Hongkong each furnished aniline dyes valued at slightly in excess of $1,000,000. The 1920 figures show the appearance of dyes direct from Germany for the first time in the post-war period. The 1920 figure for the United States was the maximum export of this country. Official statistics for China for 1921 are not available, but it is understood that the value of dyes received from the United States, as was reported in the case of indigo, shows a marked decline.

Japan.—The imports of aniline dyes in 1913, as shown by the Japanese official statistics, were 9,755,160 pounds, with a value of $2,100,255. Of this quantity 8,600,252 pounds came from Germany, while Switzerland furnished 663,977 pounds and Great Britain 178,674 pounds. In 1919, the total imports of coal-tar dyes by Japan were 2,774,830 pounds, valued at $5,463,381. The United States led in the countries furnishing these imports, with a total of 2,070,173 pounds, valued at $4,140,875, followed by Switzerland with 454,368 pounds. The quantity furnished by Germany in that year was 47,781 pounds. In 1920 total imports of coal-tar dyes were 4,451,867 pounds with a value of $7,763,214. Of this total 2,973,361

pounds, valued at $5,153,858, came from the United States, while imports from Germany, totaling 779,980 pounds, showed a large increase in the quantity supplied over that of 1919. The 1921 imports of Japan of coal-tar dyes showed a noteworthy change in the countries of origin. The total quantity imported was 5,587,881 pounds, valued at $6,488,681. Germany led in quantity supplied with a total of 3,990,232 pounds, valued at $4,636,871. The quantity of dyes from the United States was 872,845 pounds, a large decrease from that of 1920, when this country supplied 2,973,361 pounds to Japan.

India.—The official statistics of India show that the total quantity of dyes obtained from coal tar, not including indigo, imported during 1913 was 17,784,897 pounds, valued at $3,676,159. Germany supplied 13,270,694 pounds; Belgium, 1,859,091 pounds; and the United Kingdom, 1,320,005 pounds. No imports were shown of dyes from the United States. The total of all other countries was 440,302 pounds.

In 1919, the total imports of dyes, obtained from coal tar (not including indigo), was 5,053,861 pounds, with a value of $5,394,221. The United States furnished 1,036,172 pounds, valued at $1,731,445; United Kingdom, 3,522,531 pounds, with a value of $2,374,322. No imports from Germany were shown for 1919.

In 1920 the total imports of coal-tar dyes (not including indigo) were 10,283,762 pounds, valued at $10,134,645. Of this quantity, 3,506,405 pounds, valued at $2,596,238, came from the United Kingdom. The United States furnished 2,832,554 pounds, valued at $3,368,715, the largest amount ever imported by India from the United States. German dyes appeared in the Indian market during that year, the total quantity amounting to 2,687,510 pounds, with a value of $2,650,522. The imports of Swiss dyes totaled 424,930 pounds. In 1921 a significant change took place in the countries of origin of the dyes imported by India. The total quantity of imports in that year was 10,623,860 pounds. Germany led in the quantity supplied with a total of 4,770,288 pounds, nearly double the quantity received from that country in 1920, and 45 per cent of the total imports in 1921. The United Kingdom furnished 3,264,012 pounds. The United States supplied 897,570 pounds, a large decrease from that of 1920, when this country furnished India with 2,832,554 pounds. It is thus seen that Germany in 1921 supplied 45 per cent of the dyes imported into India, compared with 74 per cent in 1913, and that the large export trade of the United States to India, which reached its maximum in 1920, declined rapidly in 1921.

TABLE 12.—*German exports and imports of dyes,*[1] *1913.*

ANILINE AND OTHER COAL-TAR DYES NOT SPECIALLY MENTIONED.

	Metric tons.	Pounds.	Value.	
			Thousand marks.	Doll
Imports, total	2,577	5,681,254	5,926	1,4
Great Britain	223	491,626	513	12
Switzerland	1,725	3,802,935	3,968	9
Exports, total	64,288	141,729,325	142,079	33,8
Belgium	2,509	5,531,341	5,915	1,4
Denmark	237	522,490	560	1
France	1,382	3,046,757	4,347	1,0
Great Britain	11,016	24,285,874	22,488	5,3
Italy	4,097	9,032,246	9,083	2,1
Netherlands	1,365	3,009,279	2,786	6
Norway	270	595,242	633	1
Austria-Hungary	5,779	12,740,383	12,494	2,9
Portugal	418	921,523	1,000	2
Russia	1,098	2,420,651	3,516	8
Finland	236	520,286	584	1
Sweden	901	1,986,345	2,002	4
Switzerland	784	1,728,406	2,126	5
Spain	656	1,446,218	1,770	4
Turkey	437	963,410	916	2
British Indies	3,823	8,428,186	8,154	1,9
China	8,461	18,653,121	19,063	4,5
Japan	3,506	7,729,328	8,417	2,0
Brazil	627	1,382,284	1,682	4
Canada	443	976,638	809	1
Mexico	543	1,197,098	1,209	2
United States	13,855	30,544,733	28,223	6,7

ALIZARIN, ALIZARIN DYES AND DYES FROM ANTHRACENE.

Imports, total	603	1,329,374	754	1
Exports, total	11,040	24,338,784	21,573	5,1
France	222	489,421	780	1
Great Britain	2,657	5,857,622	4,142	9
Italy	189	416,669	522	1
Netherlands	325	716,495	523	1
Austria-Hungary	541	1,192,689	1,436	3
Russia	329	725,313	1,837	4
British Indies and other possessions	2,661	5,866,441	3,822	9
Netherlands Indies and other possessions	589	1,298,509	1,026	2
United States	2,656	5,855,418	5,463	1,3

INDIGO.

Imports, total	58	127,867	389	
Exports, total	33,353	73,530,024	53,323	12,6
France	323	712,086	1,280	3
Great Britain	1,180	2,601,428	1,592	3
Italy	662	1,459,445	1,033	2
Netherlands	611	1,347,011	850	2
Austria-Hungary	1,361	3,000,461	2,007	4
Russia	434	956,796	2,829	6
Egypt	443	976,638	857	2
British Indies and other possessions	324	714,290	1,253	2
China	21,360	47,090,256	26,878	6,3
Japan	821	1,809,977	5,732	1,3
Netherlands Indies and other possessions	954	2,103,188	1,458	3
United States	3,461	7,630,121	4,209	1,0

[1] Statistiches Jahrbuch fur das Deutsche Reich.

TABLE 13.—*Dyes, colors, and paints: Indigo, artificial—Imports into China.*

From—	1913		1919		1920	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Great Britain	40,000	$6,156	300,800	$178,205	1,476,800	$1,147,238
Germany	13,634,796	2,557,003	.....	.....	2,876,666	3,242,123
Netherlands	.....	.....	.....	.....	1,602,666	1,406,532
Belgium	24,681,060	3,656,631	4,000	11,632	1,765,866	1,455,312
France	2,358,399	423,393	1,246,400	895,028	2,917,199	2,292,991
Switzerland	.....	.....	.....	.....	3,334,532	3,460,210
Japan	1,733	266	263,867	213,255	198,267	139,706
United States	.....	.....	635,467	474,497	5,979,332	5,543,398
All other	1,930,266	394,687	61,867	56,308	662,000	340,573
Direct gross imports	42,646,256	7,038,137	2,512,399	1,828,925	20,813,328	19,028,083
Reexported abroad	36,267	5,932	6,400	4,871	61,200	48,055
Total net imports	42,609,989	7,032,205	2,505,999	1,824,054	20,752,128	18,980,028

TABLE 14.—*Dyes, colors, and paints—Aniline—Imports into China.*

From—	1913	1919	1920
Hongkong	$398,084	$321,029	$1,002,843
Dutch Indies	.....	.....	408,611
Great Britain	191,126	51,441	402,482
Germany	1,596,693	.....	1,519,967
Netherlands	175,829	.....	1,022,234
Belgium	1,502,975	50,040	1,039,256
France	47,560	439,613	43,579
Switzerland	.....	.....	482,542
Japan	11,493	1,145,646	1,352,793
Canada	.....	182,328	61,143
United States	479	2,318,090	2,543,185
All other	37,723	40,214	21,964
Direct gross imports	3,961,962	4,548,401	9,900,599
Reexported abroad	18,633	318,746	315,038
Total net imports	3,943,329	4,229,655	9,585,561

TABLE 15.—*Imports of dyes into India.*

	1913		1919		1920		1921
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.
Total of dyes obtained from coal tar (not including indigo):							
From—	*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*
United Kingdom	1,320,005	$180,990	3,522,531	$2,374,322	3,506,405	$2,596,238	3,264,012
Germany	13,270,694	2,792,875	.....	.....	2,687,510	2,650,522	4,770,288
Belgium	1,859,091	419,935	27,787	41,651	275,141	346,168	380,408
Switzerland	894,805	186,124	452,968	1,197,070	424,930	690,545	293,073
United States	.....	.....	1,036,172	1,731,455	2,832,554	3,368,715	897,570
Other countries	440,302	96,235	14,403	49,723	557,222	482,457	1,018,509
Total	17,784,897	3,676,159	5,053,861	5,394,221	10,283,762	10,134,645	10,623,860
Indigo, synthetic	731,696	319,014	14,336	11,510	147,728	119,832	149,520

TABLE 16.—*Coal-tar dyes—imports into Japan.*

From—	1913 [1]		1919		1920		1921	
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Great Britain	178,674	$36,624	123,615	$274,672	252,247	$384,801	93,721	$144,211
France	.....	.....	61,990	116,760	182,951	345,016	88,154	116,968
Germany	8,600,252	1,854,528	47,781	110,265	779,980	1,327,186	3,990,232	4,636,871
Switzerland	663,977	146,723	454,368	769,787	129,091	273,499	173,991	234,561
United States	.....	.....	2,070,173	4,140,875	2,973,361	5,153,858	872,845	874,087
Other countries	312,357	62,380	16,903	51,022	134,237	278,854	368,938	481,983
Total	9,755,260	2,100,255	2,774,830	5,463,381	4,451,867	7,763,214	5,587,881	6,488,681

[1] Aniline dyes.

Production of Dyes in Germany.

Beginning with February, 1920, detailed statements of one-quarter of the monthly production (this portion is required to be reserved for optional purchases of the allied and associated Governments by the peace treaty, Annex VI, Part II) of dyes in Germany were made to the Reparations Commission. Copies of these monthly statements from February, 1920, to March, 1922, inclusive, have been received by the Department of State, which has given permission for their publication by the Tariff Commission. A summary of these reserve stocks, containing the monthly reserve for each class of dyes, according to application, is shown in Table 17.

Production of dyes in Germany during the first year after the signing of the armistice was practically negligible compared with the pre-war output, when her exports (in 1913) were nearly 240,000,000 pounds. During February, 1920, the quantity of dyes reserved by German plants for the Allies totaled 876,449 pounds, indicating a total output of over three and one-half million pounds for that month. A progressive increase is shown for each following month, reaching a maximum output of 3,026,247 pounds in August, 1920, which corresponds to a total output of over 12,000,000 pounds monthly. During the remainder of 1920 the fluctuation varied from a minimum of 2,674,710 pounds in December to a maximum of 2,978,806 pounds in November. The total quantity of dyes reserved by the German plants from February to December, 1920, inclusive, was 25,842,201 pounds, which corresponds to a production of 103,368,804 pounds.

The quarterly reserve production for 1921 amounted to 29,110,554 pounds, which corresponds to a total production of 116,442,216 pounds for that year by the German dye plants. During 1921 the quarterly monthly production reserve for the allied associated Governments varied from a minimum of 1,976,094 pounds in February to a maximum of 3,494,165 pounds in December.

In 1922 the production for each of the first three months showed a considerable increase compared with the months of 1921, the maximum being for March, 1922, the last month for which data are available. During March the quarterly production amounted to 4,001,162 pounds, which is the highest for any month since February, 1920, the first month for which production was reported. The annual production at the March rate would amount to 192,055,776 pounds.

The total exports of coal-tar dyes from Germany in 1913 were 239,598,133 pounds. The domestic consumption of dyes in that year is estimated to be 55,000,000 pounds,[1] which would give a total production of dyes in Germany of approximately 295,000,000 pounds. The March rate is accordingly about 65 per cent of her pre-war output (1913).

Before the war Germany dominated the world's markets, producing three-fourths of the total dyes made. Over one-half of the dyes made outside of Germany were made from primary or intermediate products of German origin. Switzerland, which held second place, was entirely dependent on Germany for all materials. In England and France the dye factories were to a large extent owned and operated by German dye manufacturers. They were built in these countries on account of the working clauses in the patent laws.

[1] Verein zur Wahrung der Interessen der Chemischen Industrie, p. 37.

An examination of the March, 1922, production list shows that at the rate of the March production the total annual output would be for Alizarin, 10,071,504 pounds, compared with 6,916,592 pounds in 1921; for Indigo (paste), 39,458,208 pounds, compared with 24,589,144 pounds for the year 1921. The output of Indanthrene Blue G C D for 1921 showed a decrease from that of 1920, when 374,580 pounds were reported, whereas at the March, 1922, rate of production the output would total only 72,384 pounds. The output at the March, 1922, rate of production of all other dyes would total 142,453,680 pounds, compared with 84,691,668 pounds for 1921.

An examination, however, of the production figures of Germany in 1920 and in 1913 indicates rapid strides toward a high output of colors which compare somewhat favorably with her pre-war production, although due to government restrictions in England, France, Italy, and the United States for the free import of all colors, she has lost a part of her trade to these countries. She has regained since 1920, as previously explained, a considerable part of her export trade to the large markets of the east, namely, India, China, and Japan.

TABLE 17.—*One-quarter of production in German dye plants*[1] *reserved for purchase of Allied and Associated Governments, February, 1920, to March, 1922.*

[Pounds.]

Group.	Classification of colors.	1920					
		February.	March.	April.	May.	June.	July.
I	Alizarin red	28,629	100,347	79,070	124,401	241,194	206,251
II	Indigo paste	33,203	124,258	306,371	338,318	291,294	543,747
III	Vat colors, except Indanthrene Blue GCD	15,346	9,361	19,577	62,183	41,786	72,595
IV	Indanthrene Blue GCD	3,135	.....	3,307	9,489	11,329	14,420
V	Alizarin colors other than red	17,240	22,862	40,622	54,643	92,022	63,411
VI	Direct colors for cotton	262,123	346,301	400,221	451,138	541,534	694,700
VII	Direct colors for diazotization	63,402	51,495	54,586	44,687	88,131	126,983
VIII	Acid colors for wool	149,827	202,819	265,094	360,192	419,842	512,594
IX	Chrome colors for wool	61,313	91,257	95,605	132,287	182,647	195,246
X	Basic colors	19,912	44,374	72,289	106,555	124,035	126,723
XI	Sulphur colors	163,822	149,452	235,423	190,515	305,979	323,170
XII	Lake colors	56,958	164,229	156,163	150,085	170,742	136,196
XIII	Intermediate products	1,539	12,599	85,527	89,672	.....	.....
	Total	876,449	1,319,354	1,813,855	2,114,165	2,510,535	3,016,045

Group.	Classification of colors.	1920					Total for 11 months, 1920.
		August.	September.	October.	November.	December.	
I	Alizarin red	210,328	198,632	215,028	235,775	191,066	1,830,721
II	Indigo paste	777,774	642,729	426,599	635,419	373,803	4,493,515
III	Vat colors, except Indanthrene Blue GCD	54,828	62,608	84,366	88,410	66,938	578,028
IV	Indanthrene Blue GCD	9,370	16,043	1,131	3,554	21,867	93,645
V	Alizarin colors other than red	69,612	88,658	58,440	59,698	42,306	609,514
VI	Direct colors for cotton	573,004	593,694	666,239	648,946	600,257	5,778,166
VII	Direct colors for diazotization	113,973	95,439	117,562	117,653	103,409	977,320
VIII	Acid colors for wool	469,589	492,647	487,131	518,041	486,258	4,364,034
IX	Chrome colors for wool	200,504	208,760	216,057	163,304	224,272	1,771,252
X	Basic colors	144,595	163,661	151,145	139,805	164,207	1,257,301
XI	Sulphur colors	291,832	285,804	262,744	276,510	320,659	2,805,910
XII	Lake colors	110,838	73,565	92,690	91,661	79,668	1,282,795
	Total	3,026,247	2,922,240	2,779,132	2,978,806	2,674,710	25,842,201

[1] Peace Treaty, Annex VI, Part II.

TABLE 17.—*One-quarter of production in German dye plants* [1] *reserved for purchase of Allied and Associated Governments, February, 1920, to March, 1922*—Continued.

[Pounds.]

Group.	Classification of colors.	1921		
		January.	February.	March.
I	Alizarin red	137,999	35,077	74,101
II	Indigo paste	630,621	529,970	608,849
III	Vat colors, except Indanthrene Blue GCD	50,150	69,754	53,797
IV	Indanthrene Blue GCD	1,759	2,811	2,917
V	Alizarin colors other than red	43,563	12,560	22,000
VI	Direct colors for cotton	512,056	350,355	421,938
VII	Direct colors for diazotization	132,239	52,589	52,128
VIII	Acid colors for wool	479,602	358,821	390,547
IX	Chrome colors for wool	154,342	98,764	106,751
X	Basic colors	128,962	159,426	153,425
XI	Sulphur colors	285,498	207,532	204,669
XII	Lake colors	112,305	98,435	91,936
	Total	2,669,096	1,976,094	2,183,088

Group.	Classification of colors.	1921					
		April.	May.	June.	July.	August.	September.
I	Alizarin red	88,063	91,797	124,953	120,744	200,817	166,[illegible]
II	Indigo paste	366,405	556,210	474,174	552,056	526,110	411,[illegible]
III	Vat colors, except Indanthrene Blue GCD	86,949	110,001	97,483	86,550	95,547	84,[illegible]
IV	Indanthrene Blue GCD	22370	2,037	9,793	8,415	11,424	4,[illegible]
V	Alizarin colors other than red	18,322	16,698	32,491	35,904	25,335	23,[illegible]
VI	Direct colors for cotton	423,063	410,545	366,588	379,143	472,106	466,[illegible]
VII	Direct colors for diazotization	63,268	47,668	72,426	48,618	61,705	83,879
VIII	Acid colors for wool	430,140	390,589	401,991	365,609	353,545	381,451
IX	Chrome colors for wool	131,205	120,986	95,631	100,351	110,658	153,046
X	Basic colors	155,415	136,478	124,919	101,180	100,968	76,909
XI	Sulphur colors	252,771	255,745	277,676	331,292	308,794	389,989
XII	Lake colors	76,773	71,431	93,435	63,534	45,543	62,071
	Total	2,094,744	2,210,185	2,171,463	2,193,396	2,312,552	2,304,017

Group.	Classification of colors.	1921			Total.
		October.	November.	December.	
I	Alizarin red	141,773	266,741	281,104	1,729,148
II	Indigo paste	425,475	394,235	671,856	6,147,286
III	Vat colors, except Indanthrene Blue GCD	89,985	74,088	93,473	992,379
IV	Indanthrene Blue GCD	8,212	4,685	2,205	61,203
V	Alizarin colors other than red	16,219	26,524	26,978	300,099
VI	Direct colors for cotton	455,951	643,525	624,433	5,326,290
VII	Direct colors for diazotization	105,589	114,454	128,356	962,559
VIII	Acid colors for wool	404,546	538,526	573,456	5,068,823
IX	Chrome colors for wool	148,696	207,312	245,473	1,673,215
X	Basic colors	106,634	133,217	148,028	1,525,610
XI	Sulphur colors	480,305	534,970	573,853	4,103,034
XII	Lake colors	65,739	114,353	124,950	1,020,508
	Total	2,449,124	3,052,630	3,494,165	29,110,554

Group.	Classification of colors.	1922		
		January.	February.	March.
I	Alizarin red	332,734	254,168	209,823
II	Indigo paste	634,808	703,808	822,040
III	Vat colors, except Indanthrene Blue GCD	76,340	103,274	119,073
IV	Indanthrene blue GCD	2,205	.....	1,508
V	Alizarin colors other than red	33,336	32,388	25,831
VI	Direct colors for cotton	596,269	581,133	729,861
VII	Direct colors for diazotization	132,655	105,777	113,116
VIII	Acid colors for wool	601,208	570,828	696,860
IX	Chrome colors for wool	238,073	232,484	292,205
X	Basic colors	135,757	144,952	189,797
XI	Sulphur colors	525,351	573,325	700,887
XII	Lake colors	133,063	125,005	124,151
	Total	3,441,809	3,427,142	4,001,162

[1] Peace Treaty, Annex VI, Part II.

Other Finished Coal-Tar Products.

COLOR LAKES.

Description.—A color lake is an insoluble color pigment which consists of a precipitating agent, the coloring matter (a coal-tar dye), and a carrier (the base). The desired properties of a color lake include good coloring power, easy workability, brightness, and fastness to weather, light, alkali, and acids. The precipitating agents used for coal-tar colors include barium chloride, lead salts, aluminium hydroxide, and tannin or tannin-tartar emetic. Among the more important carriers are aluminium hydroxide, zinc white, lithopone, barytes, whiting, China clay, and certain native clays, and ochers. The principal requirements of a carrier are (1) ready reduction to a finely divided state, and (2) absence of any deleterious effect on the shade of the finished lake. The coloring matter includes those coal-tar dyes known as acid dyes, basic dyes, and mordant dyes, as well as certain azo dyes which are produced directly on the carrier. An example is the preparation of Para red from the intermediates, p-nitroaniline and b-naphthol. Another group of color lakes is made by the precipitation of a water-soluble acid dye with the aid of a mineral salt to form an insoluble product.

After precipitation the insoluble lake is filtered, dried, and ground with oil, and is then ready for use as a pigment. The color lakes included in this group are a class of pigment used for paints, lithographic inks, artists' colors, wall paper, rubber products, and for similar coloring purposes.

Production.—Total production of color lakes in 1921 amounted to 6,152,187 pounds and the quantity of sales was 6,424,612 pounds valued at $2,863,189, with an average value per pound of 45 cents. This shows a considerable decrease from the output of 1920, which was 10,983,538 pounds, valued at $5,871,820, or 53 cents per pound.

PHOTOGRAPHIC CHEMICALS.

This class of coal-tar chemicals, owing to their strong reducing properties, is used for developing photographic films, plates, and prints. They are popularly known as "developers," and are commonly sold under various trade names. The total output of this class in 1921 was 183,798 pounds, a large reduction from 1920, when 440,759 pounds were produced. The sales for 1921 were 170,221 pounds valued at $248,041. The quantity of output of each individual developer can not be published without revealing the output of individual manufacturers. The largest developer in quantity produced was hydroquinol, followed by metol (methyl-p-aminophenol-sulfate). The other products were manufactured in relatively small quantities. The average price per pound of sales during 1921 was $1.46 compared with $2.30 per pound in 1920 and $3.16 in 1919. Production of p-hydroxyphenylglycine was reported for the first time in 1921.

MEDICINALS.

Description.—This class includes some of the most important derivaties of coal tar from the standpoint of our national health and

welfare. Chemically, they include a variety of products and are used for a wide diversity of medicinal purposes. The development and preparation of medicinals constitute one of the most creditable accomplishments of the industry, as the highest technical skill is required in the manufacture of these products. The total production of medicinals in 1921 was 1,545,917 pounds and the sales were 1,876,246 pounds, valued at $2,930,324, indicating that a portion was withdrawn from stocks carried over from the previous year. The 1920 production was 5,184,989 pounds, a portion of which consisted of disinfectants which are of relatively low value. The 1921 figure for this class included only a small quantity of disinfectants. A second cause for reduction in the 1921 production of medicinals was the inclusion of methyl salicylate under flavors instead of under medicinals, as was the case in 1920.

Salvarsan, known also as arsphenamine, the hydrochloride of 3-diamino-4-dihydroxy-1-arsenobenzene, used for combating syphilis, and other protozoan infections, is one of the most important members of this group. Its production by four manufacturers in 1921 amounted to 670 pounds, and sales were 694 pounds, valued at $281,841, or $406.11 per pound. The pre-war price of "606," when this country was dependent upon Germany, was $3.50 per ampoule. The American-made product has retailed for about 60 to 75 cents per ampoule, and the Government has made purchases for less than 30 cents per ampoule. Neoarsphenamine (3-diamino-4-dihydroxy-1-arsenobenzene methanol sulfoxylate) had a total sales among the highest of the medicinals. Production of silver arsphenamine was reported for the first time in 1921.

Aspirin (acetylsalicylic acid) led all coal-tar medicinals in quantity produced, with an output by five firms of 733,510 pounds compared with 1,708,436 pounds in 1920. The sales were 935,964 pounds, valued at $686,264. The average price per pound has receded from $5.49 in 1917 to 73 cents per pound in 1921. Production of sodium salicylate by six firms ranked second in quantity manufactured—319,350 pounds, and the total sales of 352,250 pounds were valued at $100,968, or 29 cents per pound. Acetanilide, with a large decrease in production from the previous year, ranked third in quantity of output with 207,433 pounds, and the sales were 243,655 pounds, valued at $70,053. The average price per pound in 1921 was 29 cents.

Other medicinals showing a relatively large production include chloramine T (sodium p-toluene sulfochloramid); phenolphthalein, phenol sulfonates, cinchophen (phenylcinchoninic acid), phenoltetrachlorophthalein, acetphenetidin, and benzyl benzoate.

New medicinals reported in 1921 include salicaine, caffeine sodium benzoate, benzyl succinate, p-cresol benzoate, phenacaine (ethenyl-p-diethoxy diphenylamidine hydrochloride), phenyltetrachlorphthalein, potassium hydroxyquinoline sulfate, and hydroxy quinoline.

The production of salol (phenyl salicylate) showed a very large decrease from that of the previous year; the sales for 1921 were 36,200 pounds, valued at $32,451.

FLAVORS AND PERFUME MATERIALS.

Description.—These two classes of coal-tar chemicals have no sharp line of demarcation, as many of them are used as both flavors and perfumes, and a separate classification is in certain cases somewhat arbitrary. They are used as perfume materials for toilet articles, soaps, and similar products, and as flavors for food and food products.

Production.—The total production of flavors in 1921 was 901,245 pounds, and the sales amounted to 933,662 pounds, valued at $1,002,018. In 1920 the production was 166,884 pounds. This very large increase in this class taken as a group is due to the large quantity of methyl salicylate, 640,943 pounds, reported as a flavor instead of a medicinal, as was the case in 1920. The 1921 sales of methyl salicylate were 626,718 pounds, valued at $214,391.

Saccharin, used chiefly as a sugar substitute and as a tobacco sweetener, increased in quantity of output, with a production of 188,759 pounds; the sales were 235,241 pounds, valued at $521,543. Coumarin also showed a large increase over the production of the previous year, totaling 52,097 pounds. This product is used both as a soap perfume and in the preparation of vanilla extracts. The production of ethyl benzoate was 5,551 pounds, and of methyl cinnamate, 2,786 pounds. Two new flavors were reported in 1921, namely, isobutylphenyl acetate and phenylpropyl acetate.

The output of perfume materials was 119,335 pounds, a 20 per cent increase over that of 1920. Sales of these products totaled 119,691 pounds, valued at $175,815. Diethyl phthalate, used as a denaturant for alcohol in the prefume trade, led in quantity of production, and value of sales, both showing a very large increase over that of the previous year. The production for 1921 was 73,937 pounds and sales were 65,360 pounds, valued at $58,660.

Other important products of this group in quantity of production and value of sales include: Benzyl benzoate, amyl salicylate, aubepine (anisic aldehyde), benzyl acetate, cinnamic aldehyde, diphenyloxide, phenylacetic aldehyde, and methyl benzoate. New perfume materials reported in 1921 include amylphenyl acetate, benzyl cinnamate, cinnamic alcohol, and phenyl propyl alcohol.

SYNTHETIC RESINS.

The manufacture of synthetic resins is a distinctly American discovery and development and has resulted only from the most careful research and engineering skill. These products were first made by the condensation of phenol with formaldehyde and ammonia and later with hexamethylenetetramine. In recent years cresol has been used as a base and also para-coumarone. Synthetic resins are used as amber substitute in the manufacture of pipe stems, cigarette holders, and similar articles. They have a large consumption for electric insulating materials and also in the manufacture of varnishes and lacquers. In 1921 the total production of synthetic resins was 1,643,796 pounds compared with 4,659,680 pounds for the previous year. The sales for 1921 totaled 1,674,456 pounds valued at $1,352,166.

SYNTHETIC TANNING MATERIALS.

The synthetic tanning materials known as "syntans" are of qu recent development, having come into commercial use in Germany a England since 1912. They have considerable promise for use in t tanning of leather in conjunction with natural tanning extracts.

Synthetic tans are made by condensation of certain coal-t derivatives, such as the sulfonated phenols, cresols, and naphthol with formaldehyde in the presence of an acid. They are commonl used in conjunction with the natural tanning extracts. Their u is reported to result (1) in an economy of time required for tanning (2) a satisfactory leather of light color, and (3) a reduction in th amount of natural extract required. Three firms reported in 192 a total production of 1,902,597 pounds, with sales for the same yea amounting to 1,721,359 pounds valued at $141,005, or an averag price per pound of 8 cents. The 1921 production represents a d crease of 1,240,264 pounds from that of 1920, when four firms pr duced 3,142,861 pounds valued at $233,674.

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 192*

[The number in the first column identifies the dye according to the 1914 edition of the Schultz tables. T second column gives the common name of the dye. The numbers in the third column refer to the nu bered alphabetical list of manufacturers printed on page 79. An X signifies that the correspondi product was made by a manufacturer who did not consent to the publication of his identification numb in connection therewith. Blanks in the fourth and fifth columns indicate that there were actual s during 1921, but that the figures can not be published without revealing information in regard to t out out of individual firms. The blank space in the seventh column indicates that there was actual p duction of the corresponding dyes in the United States during 1921, but that the figures can not be pu lished without revealing information in regard to the output of individual firms. The figures thus c cealed are, however, included in the totals.]

Schultz[1] No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Producti 1921 (quanti
			Quantity.	Value.	Average price per pound.	
	Total finished coal-tar products.		*Pounds.* 60,434,009	$47,996,514	$0.79	*Pounds* 1,457,
	NITROSO DYES.					
4	Naphthol green	5, 55, 70				
	NITRO DYES.					
7	Naphthol yellow S	70, 72, 80, 155, X	47,080	66,085	1.45	
8	Pigment chlorine	160				
	STILBENE DYES.					
9	Direct yellow R	5, 6, 27, 34, 59, 64, 114, 116, 126.	206,245	221,347	1.07	153,
10	Stilbene yellow	53, 59				
11	Chloramine orange G	5, 6, 59, 64, 114, 116	55,999	89,805	1.60	57,
	PYRAZOLONE DYES.					
19	Fast light yellow	53, 129				
22	Xylene yellow	129				
23	Tartrazine	22, 24, 114, 129, 154, 155	526,425	945,817	1.80	559,
	All other pyrazolone	114				

[1] Since 1917 the Tariff Commission has used the Schultz—Farbstoff Tabellen—1914 for the classifica of dyes in the production tables of the census. The incompleteness of this reference book is more appa each year, as the number of dyes not listed in Schultz, production for which is reported by domestic ma facturers, increases each year. A large part of the dyes imported are similarly not listed in Schultz. I hoped that for the next dye census a more complete classification can be adopted, either a modificatio Schultz, or the Norton Census, whereby the colors which are not listed in Schultz can be reported in te of the familiar pre-war types.

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	AZO DYES.					
	Monoazo dyes.		*Pounds.*			*Pounds.*
31	Spirit yellow	27, 114				
32	Butter yellow	6, 27, 38, 72, 114	22,584	$25,605	$1.13	18,521
33	Chrysoidine Y	27, 53, 69, 72, 114	343,872	263,521	.77	253,093
34	Chrysoidine R	14, 27, 53, 55, 69, 72, 114	65,931	51,642	.78	100,246
35	Sudan G	6				
36	Sudan I	27, 38, 72, 114	25,494	23,894	.94	
37	Croceine orange	34, 93, 114, 145				
38	Orange G	22, 24, 27, 53, 69, 114, 145 X, X.	89,480	85,905	.96	91,783
40	Chromotrope 2 R	114, 116, X				
41	Fast acid fuchsine B	6, 27, 40, 114, 116	8,344	11,950	1.43	8,084
42	Amino naphthol red G	5, 30, 53, 64, 69, 114	83,931	122,445	1.46	61,433
45	Alizarin yellow G	5, 6, 24, 34, 40, 53, 69, 81, 93, 114, 117, 123, 171, X.	411,999	216,898	.53	271,285
56	Paranitraniline red	146				
57	Chromotrope 2 B	22				
58	Alizarin yellow R	5, 6, 24, 34, 40, 53, 69, 78, 81, 93, 116, 123, 145, 171.	114,302	79,250	.69	128,080
61	Victoria violet	64, 114, 116			1.75	81,453
65	Azo coralline	64, 69				
66	Amino naphthol red 6 B	53, 64, 69, 114, 117	106,653	132,864	1.25	90,790
67	Chromotrope 6 B	5, 114, X				
68	Spirit yellow R	6, 27, 38, 114	22,653	26,572	1.17	20,837
71	Azo fuchsine B	30				
72	Pigment orange R	160				
73	Helio fast red	146				
76	Sudan II	6, 27, 38, 53, 72, 114	31,650	38,117	1.20	
82	Ponceau 2 R	5, 24, 27, 34, 72, 114, 145.	248,059	180,856	.73	178,272
83	Ponceau 3 R	114, X				
88	Acid anthracene brown R.	114				
89	Metachrome brown B	22, 24, 53, X	386,164	279,968	.73	474,128
94	Azo eosine C	116				
102	Diamond flavine G	22, 69, 117				
105	Sudan brown	6				
106	Autol red RLP	146				
107	Sulphamine brown A	145				
112	Bordeaux B	5, 24, 27, 34, 69, 72, 93, 114, 116, 145.	102,590	86,604	.84	84,754
114	Chromotrope 10 B	116				
118	Geranine	59				
119	Diamine rose	20, 59, 114, 126	25,900	100,834	3.89	
124	Metanil yellow	34, 50, 53, 55, 69, 72, 114	181,411	218,060	1.20	90,385
127	Acid yellow G	53, 55, 114	5,100	5,306	1.04	
128	Methyl orange	7				
130	Orange IV	155				
141	Azo yellow	53, 54, 55, 69, 114, 155	142,959	264,683	1.85	125,358
143	Tropaeoline	5, 72				
144	Orange I	27, 114, 155, X	20,520	87,550	4.27	28,981
145	Orange II	5, 6, 24, 27, 34, 38, 53, 69, 70, 72, 114, 119, 145.	993,844	504,993	.51	922,326
151	Orange R	6, 53, 72, 114			.47	49,219
152	Permanent red 4 B	34				
153	Lake red C	97, 106, 145				
154	Palatine chrome brown	22, 114, 117	44,887	68,527	1.53	52,080
155	Acid alizarin garnet R	22, 114				
156	Palatine chrome violet	22, 114				
157	Diamond black PV	69, 114				
159	Alizarin black R	22				
160	Fast brown N	69				
161	Fast red A	5, 20, 22, 24, 27, 34, 53, 64, 72, 93, 114, 123, 145, X.	204,538	196,642	.96	120,251
163	Azo rubine	5, 27, 34, 53, 64, 69, 93, 114, 116, X.	374,429	471,776	1.26	232,216
164	Fast red VR	5, 114, 116, 117	112,542	220,433	1.96	184,957
166	Fast red E	5				
167	Croceine scarlet 3 BX	34				
168	Amaranth	27, 34, 53, 93, 114, 145, X	64,246	207,266	3.23	31,994
169	Cochineal red	24, 27, 53, 114, 145	115,968	114,936	.99	139,323
172	Lithol red R	34, 56, 114, 145, X	87,737	142,982	1.63	63,194

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	AZO DYES—contd.					
	Monoazo dyes—Contd.		*Pounds.*			*Pounds.*
177	Mordant yellow	5, 6, 34, 114, X	36,721	$36,073	$0.98	94,214
180	Eriochrome blueblack B.	22, 69, 114	8,537	9,931	1.16	
181	Salicine black U	5, 22, 27, 34, 53, 64, 69, 93, 114, 116, 117, 145, X.	1,426,550	1,073,119	.75	1,523,220
183	Erio chrome black T	22				
184	Erio chrome black A	22				
186	Lanacyl violet B	53				
188	Sulphon acid blue R	5, 64, 69, 114	302,255	505,747	1.67	336,079
189	Sulphon acid blue B	114				
190	Alkali brown	126				
193	Stanley red	126				
194	Thiazine red R	34, 59, 116	15,042	44,728	2.97	15,229
195	Rosophenine SG	59, 126, X	12,509	26,280	2.10	
197	Thiazine red G	69, 126				
198	Mimosa C	20, 64, 126	2,835	5,745	2.02	3,517
199	Cotton yellow R	126				
200	Lake red D	160				
202	Palatine chrome red B	6, 53, 104, 114, 160	17,182	43,397	2.53	21,377
	All other monoazo dyes.	22, 24, 69, 72, 114, 116, 117, 160, X, X.	685,121	822,191	1.20	696,466
	Total monoazo dyes.		7,483,243	7,516,312	1.01	7,029,401
	Disazo dyes.					
211	Resorcin brown	5, 72, 114			1.21	9,428
212	Acid brown	X				
213	Fast brown	5, 6, 114				
217	Agalma black 10 B	5, 6, 22, 27, 34, 40, 53, 69, 78, 93, 114, 116, 123, 145, X.	1,687,811	1,851,862	1.09	1,426,194
223	Sudan III	27				
224	Cloth red G	34				
227	Brilliant croceine	5, 27, 93, 114, 145	82,442	128,217	1.56	34,463
228	Ponceau 5 R	27, 69				
230	Cloth red 3 G	53				
232	Sudan IV	6, 34, 38, 72, 114				
233	Cloth red B	6, 69				
234	Cloth red G	117				
236	Wool red B	114, 117, X	43,614	61,713	1.41	
246	Cloth scarlet G	55, 72				
247	Scarlet EC	55, 114				
257	Sulphocyanine G	5, 53, 64, 69, 114, 117	381,809	665,896	1.74	355,998
263	Jet black R	114				
264	Fast sulphon black F	22, 69				
265	Sulphocyanine black	53, 64, 69, 114, 117	85,942	127,312	1.48	83,796
266	Naphthylamine black D.	5, 53, 69				
275	Diamond black	45, 114				
276	Diamond green	53				
278	Biebrich patent black	116				
279	Benzo fast scarlet	53, 114				
283	Bismarck brown	14, 27, 38, 53, 69, 70, 72, 114.	159,341	124,739	.78	153,695
284	Bismarck brown 2 R	27, 53, 55, 59, 69, 72, 114, 116.	517,065	439,614	.85	557,753
288	Palatine chrome black	117				
296	Benzo fast yellow	53				
297	Benzo fast pink 2 BL	53				
303	Paper yellow	53, 59, 114			1.22	8,223
304	Chrysophenine G	6, 53, 59, 114, 116	155,880	316,208	2.03	202,303
307	Congo red	53, 69, 93, 114, 116, 123, X.	238,099	213,542	.89	207,665
311	Orange TA	114				
312	Congo Corinth G	5, 27, 45, 69, 114, 116				
320	Bordeaux	5, 34				
322	Trisulphon violet B	114, 116, 117				
323	Dianil blue R	126				
327	Diamine violet N	5, 6, 22, 27, 53, 93, 114, 116	22,984	49,896	2.17	
328	Diamine black R O	6				
333	Oxamine black BHN	5, 6, 22, 27, 53, 93, 114, 116, 126.	483,241	720,350	1.48	281,852
336	Benzo cyanine R	114				

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	AZO DYES—contd.					
	Disazo dyes—Contd.		*Pounds.*			*Pounds.*
337	Benzo blue 2 B	5, 6, 12, 14, 22, 27, 34, 40, 53, 59, 78, 111, 114, 116, 123, X, X.	803,548	$557,457	$0.69	571,217
340	Benzo orange R	34, 53, 111, 116	22,214	19,117	.86	21,332
341	Crumpsall direct fast red.	X				
342	Chrysamine G	6, 34, 40, 114, X	12,488	12,316	.99	13,328
343	Diamine fast red F	5, 6, 22, 27, 53, 93, 114, 116, X.	49,946	104,558	2.09	35,782
344	Diamine brown	5, 6, 22, 27, 53, 93, 114, 116, X.	106,924	176,040	1.65	69,610
351	Cresotine yellow	45, 114				
355	Anthracene red	116				
362	Oxydiamine orange	114				
363	Benzopurpurine 4 B	5, 14, 27, 34, 53, 69, 78, 93, 114, 116.	249,847	300,100	1.20	152,626
365	Benzopurpurine B	45				
375	Congo Corinth B	111				
377	Azo blue	38				
378	Trisulphon blue R	38, 116				
382	Azo mauve B	114				
385	Oxamine blue 4 R	114				
386	Benzo blue BX	34, 114, 116				
391	Benzo blue 3 B	5, 14, 27, 34, 93, 114, 116	93,769	96,171	1.03	
392	Toluylene orange G	114				
393	Diphenyl brown 3 GN	38				
394	Chrysamine R	14				
400	Acid anthracene red	X				
403	Diamine black BO	6				
405	Benzopurpurine 10 B	53, 114, 116	9,954	23,199	2.33	
410	Benzazurine G	53, 114, 116	54,266	82,985	1.53	
415	Dianil blue G	116				
419	Chicago blue RW	114, 116				
421	Oxamine blue B	114				
424	Chicago blue 6 B	53, 114, 116			1.90	83,781
426	Benzamine pure blue	53, 78, 114, 116	198,596	275,570	1.39	
	All other disazo dyes	14, 40, 53, 72, 114, 116, 117, 168, X, X.	280,665	416,697	1.48	233,880
	Total disazo dyes		6,581,028	7,965,982	1.21	5,531,367
	Trisazo dyes.					
428	Columbia black	53, 114				
441	Diazo blue black RS	114				
462	Direct deep black EW	5, 6, 12, 22, 34, 40, 45, 53, 114, 123, X.	4,073,425	3,225,152	.79	2,229,842
463	Erie direct black RX	34, 45, 53, 111, 114, 116, 123.	335,508	239,572	.71	298,516
464	Erie direct green ET	5, 6, 40, 45, 114	71,505	85,774	1.20	30,055
470	Chloramine green B	5, 116				
471	Chloramine blue 3 G	116				
473	Diamine black HW	126				
474	Oxamine green B	5, 6, 12, 34, 53, 78, 114, 116, 123.	212,232	257,467	1.21	155,753
475	Oxamine green G	14, 34, 45, 53, X	100,228	103,010	1.03	62,028
476	Benzamine brown 3 GO	6, 34, 59, 114, 116, 123, X	544,933	624,377	1.15	491,347
477	Congo brown G	5, 6, 53, 69, 114, 116, 126, X.	193,466	279,812	1.45	213,403
480	Congo brown R	5				
	All other trisazo dyes	40, 53, 78, 111, 114, 116	307,429	464,237	1.51	353,154
	Total trisazo dyes		5,928,274	5,397,135	.91	3,885,557
	Tetrakisazo dyes.					
485	Benzo brown G	14, 45, 53, 59, 69, 116	59,349	63,188	1.06	53,326
487	Benzo brown B	27, 45, 59, 116	38,633	44,291	1.15	41,289
	All other tetrakisazo dyes.	126				
	All other azo dyes	5, 6, 14, 22, 30, 34, 38, 53, 59, 64, 69, 78, 93, 116, X.	459,479	583,712	1.27	519,815
	Total azo dyes		20,551,196	21,572,485	1.05	17,062,396

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	DIPHENYLMETHANE DYES.		*Pounds.*			*Pounds.*
493	Auramine	38, 53, 103	152,326	$308,454	$2.02	94,484
	TRIPHENYLMETHANE DYES					
495	Malachite green	40, 50, 70, 103, 114	88,664	174,727	1.97	
497	New fast green 3 B	53				
498	Turquoise blue	64				
499	Brilliant green	103, 114				
502	Guinea green	30, 53, 114	46,808	184,262	3.94	
503	Brilliant milling green B	114				
505	Light green	114				
506	Erioglaucine	114				
511	Para-fuschsine	114				
512	Magenta (or fuchsine)	34, 50, 53, 70, 72, 82, 114, 133, 145, 157, X.	68,210	223,548	3.28	49,797
513	New fuchsine O	114				
515	Methyl violet	34, 50, 53, 72, 77, 114, 119, 157.	256,729	426,822	1.66	190,643
516	Crystal violet	22, 53				
517	Methyl violet 5B	114				
521	Aniline blue	34, 70, 72, 133, X	56,955	165,645	2.91	87,464
524	Acid magenta	34, 82				
528	Fast acid violet 10 B	30, 53, 64	11,712	34,213	2.92	
530	Acid violet	30, 53, 64, 114	70,366	256,420	3.64	43,043
531	Eriocyanine	114				
536	Alkali blue	34, 50, 72, 82, 114, 119, 133, 145, 157, X.	49,145	168,133	3.42	73,596
538	Methyl blue for cotton	82				
539	Soluble blue	34, 50, 82, 114, 119	21,669	90,576	4.18	22,356
543	Patent blue	114				
545	Patent blue A	30, 114				
548	Acid violet 6 BN	53				
558	Victoria blue R	53				
	All other triphenylmethane dyes.	22, 53, 114				
	Total triphenylmethane dyes.		786,845	2,153,636	.27	722,421
	DIPHENYLNAPHTHYLMETHANE DYES.					
559	Victoria blue B	22, 53				
565	Acid blue B	54				
566	Wool green S	53, 54, 64, 69, 114, 117	166,338	312,483	1.88	164,581
571	Rhodamine 6 G	53, 133				
	XANTHONE DYES.					
573	Rhodamine B	53				
580	Fast acid violet B	53				
582	Fast acid violet A 2 R	53				
585	Uranine	53, 72				
587	Eosine	53, 70, 72, 119, X	46,492	116,579	2.51	69,073
589	Eosine FF	53				
592	Erythrosine	53, 72, 114, 119, X	6,282	48,514	7.72	6,644
593	Phloxine P	53				
595	Rose bengale	53				
597	Rose bengale B	72				
599	Galleine	173				
600	Coerulein	173				
	All other xanthone dyes	119				
	Total xanthone dyes.		103,843	383,629	3.69	126,925
	ACRIDINE DYES.					
606	Phosphine	72, 114				
	QUINOLINE COLORING MATTER.					
613	Quinoline yellow	114				

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	THIOBENZENYL DYES.		*Pounds.*			*Pounds.*
615	Thioflavine S	126				
616	Primuline	20, 53, 64, 114, 126, X	168,404	$230,922	$1.37	129,281
617	Columbia yellow	20, 64, 114, 116, 126	114,663	181,745	1.59	86,418
	OXAZINE AND THIAZINE DYES.					
622	Delphine blue B	6, 40, 114, 117, X	27,027	61,053	2.26	
626	Gallocyanine	5, 6, 24, 40, 114, 173	136,879	333,780	2.44	140,064
631	Chromocyanine V	114				
649	Cotton blue or Meldola's blue	6, 27, 93, 114	28,110	59,675	2.12	33,970
658	Methylene blue	24, 40, 53, 70, 114, 136, 170.	256,550	497,136	1.94	209,395
660	Methylene green	114				
667	Brilliant alizarin blue	64, 69				
	AZINE DYES.					
670	Neutral red	7				
672	Azo carmine	53				
679	Safranine	53, 70, 114, 136	78,571	204,454	2.60	52,771
680	Methylene violet	77				
681	New fast gray	24, 38, 116				
683	Safranine MN	114				
687	Induline (spirit soluble)	20, 27, 34, 38, 69, 72, 114	50,986	38,346	.75	55,339
688	Nigrosine (spirit soluble)	20, 24, 27, 38, 69, 72, 114, 117	101,559	70,800	.70	168,402
689	Induline (soluble in water)	20, 69, 72, 114	102,929	98,932	.96	92,988
700	Nigrosine (soluble in water)	20, 24, 69, 72, 114, 117	846,537	571,798	.68	626,706
	All other azines	114				
	SULFUR DYES.					
720	Sulphur black	14, 38, 40, 53, 69, 75, 93, 114, 170, 171.	9,277,525	2,136,525	.23	7,832,696
	Sulphur blue	14, 19, 40, 53, 69, 77, 93, 114, 116, 157.	544,931	351,424	.64	190,621
	Sulphur brown	6, 34, 38, 40, 41, 53, 69, 77, 93, 158.	997,581	384,366	.38	1,159,115
	Sulphur green	38, 40, 41, 53, 69, 77, 93	56,916	46,619	.82	70,428
	Sulphur maroon	40, 53, 93, 172	179,882	170,387	.95	230,773
	Sulphur olive	40, 41, 69, 93, 172	42,059	19,967	.47	55,920
	Sulphur orange	40, 69, 114				
	Sulphur tan	14, 34, 41, 69, 172	86,788	51,568	.59	121,390
	Sulphur yellow	14, 40, 41, 53, 172	303,766	220,745	.73	316,399
	All other sulphur dyes	114				
	Total sulfur dyes		11,827,181	3,687,466	.31	10,239,255
	ANTHRAQUINONE DYES.					
703	Indanthrene dark blue BO	10, 53, 116			2.31	36,971
705	Indanthrene green B	53, 116				
707	Indanthrene violet RR	53				
720	Alizarin	19, 53, 114	34,236	22,258	.65	
729	Alizarin orange	114				
762	Alizarin brown	40, 53, 160, 173	39,907	52,653	1.32	59,613
764	Alizarin SX	114				
769	Anthracene blue WR	19, 114				
814	Algol yellow WG	10				
817	Algol yellow R	10				
819	Algol red R	10				
820	Indanthrene blue	53, 116				
842	Indanthrene blue GCD	53, 116				
849	Indanthrene yellow	53, 116				
858	Alizarin saphirol B	69, 114				
867	Indanthrene brown B	116				
	All other anthraquinone dyes	59, 116, 173				

TABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	INDIGO AND ITS DERIVATIVES.		*Pounds.*			*Pounds.*
874	Indigo, synthetic	52, 53, 114	9,413,308	$4,257,572	$0.45	6,673,968
877	Indigo extract	5, 15, 53, 98, 114, 157	723,025	472,253	.65	585,931
879 880 883	Brom indigos	52				
	ANILINE BLACK GROUP.					
922	Aniline black	145				
923	Ursol	53, 66, 157				
	Total aniline black dyes.		103,267	202,704	1.96	107,890
	FOOD DYES.					
23	Tartrazine	24, 114, 164				
83	Ponceau 3 R	24, 114				
144	Orange I	24, 114				
168	Amaranth	24, 114, 164				
505	Light green SF (yellowish).	164				
592	Erythrosine	24				
877	Indigo disulfonic acid	24, 114				
	Yellow AB	6, 72, 114				
	Yellow OB	72				
	PHOTOCHEMICAL DYES.					
	Alizarin yellow R	58				
	Ethyl orange	58				
	E. yellow	58				
	p-Hydroazobenzenesulfonate.	58				
	Methyl orange	58				
	Methyl red	58				
	Orthochrome	58				
	Pinacyanol	58				
	Propyl red	58				
	Resorcin yellow	58				
	Bacteriological stains, biological stains and indicators.	36, 68, 83, 95, 169	157	15,717	101.17	
	Total dyes		47,513,762	39,283,956	.83	29,008,609
	COLOR LAKES.					
	Black lakes	5, 40, 53, 73, 146, 168, X.	266,877	33,793	.13	242,095
	Blue lakes	11, 21, 32, 40, 53, 57, 60, 73, 84, 90, 94, 104, 140, 146, 147, 148, 149, 160, 168, X, X, X, X, X, X, X, X, X.	347,620	228,091	.66	360,807
	Brown lakes	32, 48, 53, 60, 73, 90, 146, 147, 150, X, X, X.	27,225	3,576	.13	27,986
	Eosine lakes	11, 21, 32, 48, 57, 60, 73, 84, 90, 104, 140, 145, 146, 147, 148, 149, X, X, X, X, X, X, X, X, X, X.	314,973	243,029	.77	309,326
	Green lakes	11, 21, 32, 48, 53, 57, 73, 84, 90, 94, 104, 146, 147, 148, 149, 168, X, X, X, X, X, X, X, X, X.	195,294	83,316	.43	200,924
	Lithol red lakes	11, 21, 48, 53, 60, 73, 84, 90, 92, 96, 104, 130, 140, 145, 146, 147, 149, 159, 168, X, X, X, X, X, X, X, X, X.	288,320	238,939	.83	277,733

ABLE 18.—*Production and sales of dyes and other finished coal-tar products during 1921*—Continued.

Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921 (quantity).
		Quantity.	Value.	Average price per pound.	
COLOR LAKES—contd.		*Pounds.*			*Pounds.*
Maroon lakes	11, 21, 32, 48, 53, 57, 73, 84, 90, 92, 100, 101, 104, 145, 146, 168, X, X, X, X, X, X.	552,570	$207,817	$0.38	560,775
Orange lakes	11, 21, 32, 48, 53, 57, 60, 73, 90, 94, 96, 104, 140, 146, 147, 148, 160, 168, X, X, X, X, X, X, X, X.	260,964	82,169	.31	233,818
Para red	11, 21, 40, 48, 57, 73, 84, 90, 92, 96, 100, 101, 104, 145, 146, 149, 160, 165, 168, X, X, X, X, X, X, X, X, X.	2,049,372	621,985	.30	1,925,017
Red lakes	11, 21, 32, 48, 53, 57, 60, 73, 94, 96, 101, 104, 107, 140, 146, 147, 148, 149, 159, 160, 165, X, X, X, X, X, X, X, X, X, X.	1,045,004	516,755	.49	1,002,749
Scarlet lakes	11, 21, 32, 48, 53, 57, 60, 73, 84, 90, 96, 100, 101, 140, 145, 146, 148, 149, 159, 160, 165, 168, X, X, X, X, X, X, X, X, X.	471,226	177,466	.38	438,115
Violet lakes	11, 21, 32, 48, 53, 57, 60, 73, 84, 90, 94, 96, 104, 140, 146, 147, 148, 149, 168, X, X, X, X, X, X, X, X.	178,311	202,859	1.14	182,021
Yellow lakes	11, 48, 53, 60, 73, 84, 90, 94, 104, 145, 146, 147, 148, 149, 168, X, X, X, X, X, X, X.	202,911	104,048	.51	190,988
All other lakes	X				
Total color lakes		6,424,612	2,863,189	.45	6,152,187
PHOTOGRAPHIC CHEMICALS.					
p-Aminophenol hydrochloride.	31				
Diaminophenol hydrochloride.	167				
Hydroquinol	139, 173				
p-Hydroxyphenylglycine.	58				
Methyl p-aminophenol sulfate (metol).	58, 139				
Total photographic chemicals.		170,221	248,041	1.46	183,798
MEDICINALS.					
Acetanilide	3, 108, 112, 120, 131, X	243,655	70,053	.29	207,433
Acetphenetidin	X				
Acriflavine(3:6diamino 10-methylacridine chloride).	1, 162				
Ammonium benzoate	144				
Ammonium salicylate	X				
Arsphenamine	47, 49, 105, 110	694	281,841	406.11	670
Aspirin (acetylsalicylic acid).	18, 52, 112, X, X	935,964	686,264	.73	733,510
Benzocaine or anesthesine (ethyl-p-amino benzoate).	1, 24, 110, 144	910	18,010	19.79	
Benzyl benzoate	7, 61, 108, 162	10,702	16,700	1.56	
Benzyl succinate	144, 175, X				
Bismuth betanaphthol	108, 131				
Bismuth tribromophenol.	108, 120				
Caffeine sodium benzoate.	144				

TABLE 18.—*Production and sale of dyes and other finished coal-tar products dur 1921*—Continued.

Schultz No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Produc 1921 (quant
			Quantity.	Value.	Average price per pound.	
	MEDICINALS—contd.		*Pounds.*			*Pound*
	Chlorcosane	112				
	Chloramine T (sodium p-toluenesulfochloramide).	26, 112				
	Cinchophen (phenyl cinchoninic acid).	1, 24				
	Creosote carbonate	24, 53, 116, 129				
	p-Cresol benzoate	144				
	Cresol	116				
	Dibromohydroxy mercury fluorescein, sodium salt	83				
	Dichloramine T (p-toluene sulfone dichloramide).	24, 112				
	Guaiacol benzoate	144				
	Guaiacol carbonate	53				
	Guaiacol crystals	53, 116				
	Guaiacol liquid	53, 116				
	Halozone (p-sulfone dichloroamidobenzoic acid).	112				
	Hydroxyquinoline and sulfate	91				
	Lithium benzoate	144, X				
	Magnesium salicylate	X				
	Mercuric benzoate	144				
	Methoxymethy salicylate.	18				
	b-Naphthol benzoate	24, 61, 108	1,831	$4,945	$2.70	
	Neoarsphenamine	47, 110				
	Novaspirin (methylene citryl salicylic acid).	X				
	Other salicylates	131				
	Phenacaine (ethenyl-p-diethoxydiphenyl amidine hydrochloride.)	110				
	Phenolphthalein	X				
	Phenolsulfonates (calcium, sodium, zinc, etc.).	1, 24 102, 108, 131	64,923	16,581	.26	28
	Phenolsulfonephthalein.	68, 83				
	Phenoltetrachlorophthalein.	83				
	Potassium hydroxyquinoline sulfate.	91				
	Procaine (p-aminobenzoyldiethylaminoethanol).	1, 110				
	Proflavine (3:6-diamino acridine sulfate).	1				
	Salicaine (salicyl alcohol).	24				
	Salol, U. S. P. (phenyl salicylate).	108, 112, X	36,200	32,451	.90	
	Salophen (acetyl-p-aminophenol salicylate).	1 8				
	Silver arsphenamine	110				
	Sodium cinnamate	X				
	Sodium salicylate	52, 108, 112, 131, 143, X	352,250	100,968	.29	319
	Strontium salicylate	X				
	Tolysin (p-methylphenylcinchoninic acid ethyl ether).	24				
	All other medicinals	85				
	Total medicinals		1,876,246	2,930,324	1.56	1,545
	FLAVORS.					
	Benzaldehyde	X				
	Coumarin	X, X, X	53,525	220,371	4.12	52
	Ethyl benzoate	61, 63, 144, 150, 162, X, X.	4,937	10,367	2.10	5
	Ethyl cinnamate	61, 63, 89, 150, 162, X	2,341	10,085	4.31	

TABLE 18.—*Production and sale of dyes and other finished coal-tar products during 1921*—Continued.

Results No.	Common name.	Manufacturers' identification number (according to list on p. 79).	Sales, 1921.			Production, 1921 (quantity).
			Quantity.	Value.	Average price per pound.	
	Flavors—Continued.		*Pounds.*			*Pounds.*
	Ethyl salicylate	61, 63, 150				
	Iso butylphenylacetate	61				
	Methyl cinnamate	61,63,89,150, 162, X, X.	2,846	$13,047	$4.59	2,786
	Methyl salicylate	52, 63, 108, 143, 150, X, X, X.	626,718	214,391	.34	640,943
	Phenylpropyl acetate	61				
	Saccharin (benzosulfinide).	26, 139, X, X				
	Total flavors		933,662	1,002,018	1.07	901,245
	PERFUME MATERIALS.					
	Acetophenone	61, 63, 89, 150	187	1,000	5.37	165
	Amylphenyl acetate	X				
	Amyl salicylate	61, 63, 150, X, X	6,831	9,746	1.43	3,327
	Aubepine (anisic aldehyde).	61, 62, 63, 89, 150, X	2,211	9,602	4.36	2,197
	Benzophenone	151				
	Benzyl acetate	7, 61, 63, 89, 150, 162, X	9,331	10,855	1.16	7,191
	Benzyl benzoate	1, 7, 61, 63, 89, 108, 144, 150, 162, X, X.	13,546	19,165	1.41	13,789
	Benzyl butyrate	61, 89				
	Benzyl cinnamate	89, 150				
	Benzyl formate	150, X				
	Benzylphenyl acetate	150				
	Benzyl propionate	61, X				
	Benzylidene acetone	150, X				
	Bromstyrol	61, 89, 150, 162, X	306	1,330	4.35	252
	Cinnamic acid	X				
	Cinnamic alcohol	89				
	Cinnamic aldehyde	61, 62, 63, 150, X	4,388	23,183	5.28	4,977
	Diethyl phthalate	61, 63, 89, 150, 162, X	65,360	58,660	.90	73,937
	Dimethyl anthranilate	150				
	Diphenylmethane	89, 150, 162				
	Diphenyl oxide	89, 150, X				
	Ethylphenyl acetate	X				
	Iso-butyl benzoate	X				
	Iso-butyl salicylate	150				
	Methyl anthranilate	61, 63, 89, 150, 162, X	947	4,611	4.88	655
	Methyl benzoate	61, 63, 144, 150, 162, X, X, X.	1,782	2,421	1.36	2,176
	Methyl guaiacol	150				
	Methyl-p-cresol	150				
	Methylphenyl acetate	X				
	Nerolin (b-naphthol ethyl ether).	63, 150, X				
	Phenylacetic aldehyde	61, 63, 89, 150, 162, X	901	11,843	13.15	822
	Phenylethyl acetate	61, 89, 150, X	44	660	15.00	
	Phenylethyl alcohol	61, 63, 89, 150, 162	140	1,584	11.31	157
	Phenylpropyl acetate	X				
	Phenylpropyl alcohol	X				
	Salicylic aldehyde	63				
	Yara yara (b-naphthol methyl ether).	63, X				
	Total perfumes		119,691	175,815	1.47	119,335
	SYNTHETIC PHENOLIC RESINS.					
	Derived from coumarone.	17				
	Derived from cresol	135, X, X				
	Derived from phenol	135, X, X	493,899	649,951	1.32	495,152
	Total resins		1,674,456	1,352,166	.81	1,643,796
	SYNTHETIC TANNING MATERIALS.					
	Barretan	17				
	Liberty extract	93				
	Synex	X				
	Total tanning materials.		1,721,359	141,005	.08	1,902,597

TABLE 19.—*Comparison of production of dyes and other finished coal-tar produc and 1921.*

Schultz No.	Product.	Total produ	
		1921 (quantity).	(q
		Pounds.	
	Total finished coal-tar products	51,457,565	11
	STILBENE DYES.		
9	Direct yellow R	153,547	
11	Chloramine orange G	57,582	
	PYRAZOLONE DYES.		
23	Tartrazine	559,134	
	AZO DYES.		
	Monoazo dyes.		
32	Butter yellow	18,521	
33	Chrysoidine Y	253,693	
34	Chrysoidine R	100,246	
38	Orange G	91,783	
41	Fast acid fuchsine B	8,084	
42	Amino naphthol red G	61,433	
48	Alizarin yellow G	271,285	
58	Alizarin yellow R	128,080	
66	Amino naphthol red 6 B	90,790	
82	Ponceau 2 R	178,272	1,
112	Bordeaux B	84,754	
134	Metanil yellow	90,385	
144	Orange I	28,981	
145	Orange II	922,326	1,
161	Fast red A	120,251	
163	Azo rubine	232,216	
168	Amaranth	31,994	
169	Cochineal red	139,323	
181	Salicine black U	1,523,220	1,
188	Sulphon acid blue R	336,079	
202	Palatine chrome red B	21,377	
	All other monoazo dyes	696,466	
	Total monoazo dyes	7,029,401	11,
	Disazo dyes.		
217	Agalma black 10 B	1,426,194	2,
227	Brilliant croceine	34,463	
283	Bismark brown	153,695	
284	Bismark brown 2 R	557,753	
303	Paper yellow	8,223	
304	Chrysophenine G	202,303	
307	Congo red	207,665	1,
333	Oxamine black BHN	281,852	
337	Benzo blue 2 B	571,217	1,
340	Benzo orange R	21,332	
342	Chrysamine G	13,328	
343	Diamine fast red F	35,782	
344	Diamine brown	69,610	
363	Benzopurpurine 4 B	152,626	
	All other disazo dyes	233,880	
	Total disazo dyes	5,531,363	12,
	Trisazo dyes.		
462	Direct deep black EW	2,229,842	7,
463	Erie direct black RX	298,516	2,
474	Oxamine green B	155,753	
475	Oxamine green G	62,028	
476	Benzamine brown 3 GO	491,347	
477	Congo brown G	213,403	
	All other trisazo dyes	353,154	
	Total trisazo dyes	3,885,557	11,
	Tetrakisazo dyes.		
485	Benzo brown G	53,326	
	All other azo dyes	519,815	
	Total azo dyes	17,062,366	36,

TABLE 19.—*Comparison of production of dyes and other finished coal-tar products, 1920 and 1921*—Continued.

Schultz No.	Product.	Total production.	
		1921, quantity.	1920, quantity.
	TRIPHENYLMETHANE DYES.		
		Pounds.	*Pounds.*
512	Magenta (or fuchsine)	49,797	284,285
515	Methyl violet	190,643	600,873
530	Acid violet	43,043	144,207
536	Alkali blue	73,596	74,253
539	Soluble blue	22,356	98,770
	Total triphenylmethane dyes	722,421	2,482,169
	DIPHENYL NAPHTHYL METHANE DYES.		
566	Wool green S	164,581	212,362
	XANTHONE DYES.		
587	Eosine	69,073	85,489
592	Erythrosine	6,644	6,874
	Total xanthone dyes	126,925	215,044
	THIOBENZENYL DYES.		
616	Primuline	129,281	183,179
617	Columbia yellow	86,418	100,248
	OXAZINE AND THIAZINE DYES.		
626	Gallocyanine	140,064	70,169
639	Methylene blue	209,395	577,264
	AZINE DYES.		
679	Safranine	52,771	149,629
697	Induline (spirit soluble)	55,339	140,400
698	Nigrosine (spirit soluble)	168,402	919,242
699	Induline (soluble in water)	92,988	168,048
700	Nigrosine (soluble in water)	626,706	2,743,021
	SULFUR DYES.		
730	Sulphur black	7,832,696	16,305,037
	Sulphur blue	190,621	1,514,811
	Sulphur brown	1,159,115	1,269,731
	Sulphur green	70,428	177,927
	Sulphur maroon	230,773	133,407
	Sulphur olive	55,920	129,582
	Sulphur tan	121,390	95,038
	Sulphur yellow	316,399	408,967
	Total sulfur dyes	10,239,255	20,034,500
	ANTHRAQUINONE DYES.		
782	Alizarin brown	59,613	42,840
	INDIGO AND ITS DERIVATIVES.		
874	Indigo, synthetic	6,673,968	18,178,231
877	Indigo extract	585,931	1,395,000
	Total dyes	39,008,690	88,263,776
	COLOR LAKES.		
	Black lakes	242,095	382,277
	Blue lakes	360,807	645,647
	Brown lakes	27,986	113,630
	Eosine lakes	309,326	600,618
	Green lakes	200,924	431,970
	Lithol red	277,733	496,000
	Maroon lakes	500,775	740,765
	Orange lakes	233,818	339,275
	Para red lakes	1,925,017	970,589
	Red lakes	1,002,749	4,410,797
	Scarlet lakes	438,115	783,011
	Violet lakes	182,021	336,969
	Yellow lakes	190,988	536,122
	Total color lakes	6,152,187	10,983,538
	Total photographic chemicals	183,798	440,759

TABLE 19.—*Comparison of production of dyes and other finished coal-tar products, 1920 and 1921*—Continued.

Schultz No.	Product.	Total production.	
		1921, quantity.	1920, quantity.
	MEDICINALS.	*Pounds.*	*Pounds.*
	Acetanilide	207,433	1,255,140
	Arsphenamine	670	605
	Aspirin (acetylsalicylic acid)	733,510	1,708,436
	Phenolsulfonates (calcium, sodium, zinc, etc.)	28,408	181,516
	Sodium salicylate	319,350	450,764
	Total medicinals	1,545,917	5,184,989
	Total flavors	901,245	166,884
	PERFUME MATERIALS.		
	Acetophenone	165	742
	Amyl salicylate	3,327	14,982
	Total synthetic phenolic resins	1,643,796	4,659,680

PRICES OF DOMESTIC DYES.

The following table (No. 20) contains a comparison of the domestic sales prices of 100 dyes for the years 1917 to 1921, inclusive, together with the invoice value for the same dyes imported during the year 1914. The colors included in this table represent about 88 per cent of the domestic production of dyes in 1921. It should be pointed out that the domestic sales prices are not directly comparable with the invoice values in 1914. The latter values do not represent the cost to the consumer as the importer's profit should be added to these figures, and in most cases the invoice value does not include "charges for containers and packing, freight, and insurance to seaport, consular certification, minor shipping charges at point of departure and at seaport."

Column 1 contains the Schultz number as indicated in "Farbstoff-Tabellen," by Gustav Schultz, 1914 edition.

Column 2 contains the common name of the dye as adopted by the Tariff Commission for designating all dyes reported under a given Schultz number (column 1).

Column 3 contains the domestic sales price reported to the Tariff Commission. This represents the weighted average price of all manufacturers for those dyes reported under a given Schultz number. Most of these prices were published in the "Census of Dyes and Coal-Tar Chemicals, 1917, 1918, 1919, and 1920."

Column 4 shows the invoice price (1914), which represents the weighted average of all dyes classified under a given Schultz number in "Artificial Dyestuffs Used in the United States," Department of Commerce, Special Agents Series No. 121, by Thomas H. Norton. These invoice prices are considerably below the price at which these dyes were sold to the consumer in this country. This weighted average value for all types is usually higher than the invoice price per pound for those dyes representing the bulk of the importation under a given Schultz number. An examination of the individual dyes imported under given Schultz numbers in the Norton census

wide variation in prices, frequently amounting to several per cent. This is chiefly due to the great variation in the ation of the different dyes and also to the variation in prices l and pure brands, which are more costly than the ordinary

erage price of all dyes produced in 1917 was $1.26 per pound; $1.07 per pound; for 1919, $1.07 per pound; for 1920, $1.08, 1921, $0.83 per pound. The tendency has been to reduce cost of production and sales price of dyes produced in the tates.

eductions have occurred notwithstanding the yearly develop- l production of new colors of greater value and complexity. ve tended to increase the average value per pound of all duced.

ted in the 1917 census the import statistics show that for ears before the war artificial dyes imported into the United nually were valued at between $9,000,000 and $10,000,000, hermore, it is probable that the cost of these dyes used in the tates to the primary consumers (textile mills, tanners, etc.) less than $20,000,000 nor more than $25,000,000 per year. al importation of dyes in 1914, as stated in the Norton as 45,950,895 pounds. On the basis of the above values 914 quantity imported, the cost of the dyes to the consumer 44 to 53 cents per pound, the invoice cost on the basis of alue of $10,000,000 would be 22 cents per pound. The 1921 sales price of 83 cents per pound is nearly comparable pre-war sales price of 44 to 53 cents per pound.

20.—*Domestic prices of dyes, 1917 to 1921, with the 1914 invoice values.*

Name.	United States production, 1921.	Average price per pound.					1914 invoice value imported dyes (weighted average of all types).
		1917	1918	1919	1920	1921	
	Pounds.						
et yellow R	153,547	$2.55	$2.61	$1.74	$1.49	$1.07	$0.178
ene yellow					1.53	1.22	.162
ramine orange G	57,582	3.32	2.86	1.99	1.88	1.60	.239
razine	559,134	1.50	1.91	2.04	1.86	1.80	.200
rsoidine Y	253,693	1.09	.77	1.04	.87	.77	.136
rsoidine R	100,246	1.22	1.22	1.12	.79	.78	.165
eine orange		1.13	.89	.88	1.04	.86	.133
ge G	91,783	1.25	.92	1.04	1.22	.96	.148
do naphthol red G	61,433	3.04	1.16	.97	1.78	1.46	.150
arin yellow G	271,285	.59	.68	.72	.63	.53	.077
arin yellow R	128,080	.83	.91	.84	.86	.69	.154
do naphthol red 6 B	90,790		.88	.81	1.51	1.25	.604
eau 2 R	178,272	1.15	.79	.80	.80	.73	.095
deaux B	84,754	1.46	1.02	.91	.93	.84	.159
mine rose			5.56	5.15	5.33	3.89	.411
anil yellow	90,385	2.24	1.61	1.65	1.64	1.20	.164
l yellow G		1.32	.85		.43	1.04	.176
yellow	125,358	2.04	2.02	1.95	2.08	1.85	.249
ge II	922,326	.98	.68	.63	.62	.51	.081
atine chrome brown	52,080	1.90	2.00	1.68	1.55	1.53	.256
mond black P. V					1.65	1.25	130
red A	120,251	1.19	1.03	1.05	1.04	.96	.118
rubine	232,216	2.71	1.51	1.43	1.43	1.26	.198
red V, R	144,957	2.25	1.25	2.20	2.28	1.96	.188
aranth	31,994	1.31	.88	2.98	2.11	3.23	.138
hineal red	139,323	1.44	1.16	1.32	1.26	.99	.127
ol red R	63,194	1.25	2.38	.39	1.52	1.63	.083
dant yellow	*94,214*	.74	1.35	1.89	.81	.98	.149
ine black U	*1,529,220*	2.92	1.62	1.25	1.10	.75	.156

TABLE 20.—*Domestic prices of dyes, 1917 to 1921, with the 1914 invoice values—Co*

Schultz No.	Name.	United States production, 1921.	Average price per pound.					19 inv va impo dy (wei ave of typ
			1917	1918	1919	1920	1921	
		Pounds.						
188	Sulphon acid blue R	336,079	$2.25	$2.25	$2.02	$1.95	$1.67	$
217	Agalma black 10 B	1,428,194	1.08	1.26	1.47	1.29	1.09	
227	Brilliant croceine	34,463	1.35	1.92	2.41	2.23	1.56	
236	Wool red B		2.50	2.10	2.67	2.64	1.41	
257	Sulphon cyanine	365,998	2.25	2.25	2.21	2.26	1.74	
265	Sulphon cyanine black	83,796	2.25	2.10	1.91	1.80	1.48	
266	Naphthylamine black D		1.89	.84	1.01	.87	.94	
275	Diamond black		2.50	1.40	1.48	1.55	1.25	
283	Bismark brown	153,695	1.17	.81	1.01	.84	.78	
284	Bismark brown 2 R	557,753	1.48	.97	1.04	.91	.85	
304	Chrysophenine G	202,303	12.64	5.71	2.53	2.81	2.03	
307	Congo red	207,665	2.47	2.01	1.12	.86	.89	
327	Diamine violet N				3.32	2.97	2.17	
333	Oxamine black B H N	281,852	2.50	3.25	2.72	2.49	1.48	
337	Benzo blue 2 B	571,217	2.00	1.37	1.00	.88	.69	
340	Benzo orange R	21,332	2.00	1.56	.88	1.07	.86	
342	Chrysamine G	13,328	1.97	1.53	1.36	1.08	.99	
343	Diamine fast red F	35,782			2.72	2.59	2.09	
344	Diamine brown	69,610		2.60	2.20	1.99	1.65	
363	Benzo purpurine 4 B	152,626	2.82	2.46	1.80	1.46	1.20	
391	Benzo blue 3 B		2.32	2.23	1.69	1.67	1.03	
405	Benzo purpurine 10 B			4.73	2.07	2.47	2.33	
410	Benzazurine G			3.00	3.18	1.98	1.53	
419	Chicago blue R W	83,781			2.40	1.88	1.67	
424	Chicago blue 6 B				3.08	2.11	1.90	
426	Benzamine pure blue		5.00	4.49	1.97	2.43	1.39	
462	Direct deep black E W	2,229,842	.75	.85	1.04	1.03	.79	
463	Erie direct black R X	208,516			1.04	.99	.71	
474	Oxamine green B	155,753	2.30	2.20	1.85	1.51	1.21	
475	Oxamine green G	62,028	2.16	2.09	2.14	1.20	1.03	
476	Benzamine brown 3 G O	491,347	1.80	1.70	1.65	1.60	1.15	
477	Congo brown G	213,403	2.00	2.25	1.83	1.58	1.45	
485	Benzo brown G	53,326	1.80	1.50	1.23	1.39	1.06	
493	Auramine	94,484	3.08	3.76	3.08	2.48	2.02	
495	Malachite green		6.28	5.60	3.26	3.32	1.97	
499	Brilliant green			5.63	4.66	4.23	3.68	
502	Guinea green		8.50	8.10	5.12	5.22	3.94	
512	Magenta	49,797	9.10	7.72	4.57	4.67	3.28	
515	Methyl violet	190,643	3.84	2.78	2.44	2.39	1.66	
521	Aniline blue	87,464	4.85	5.56	4.86	6.82	2.91	
530	Acid violet	43,043	8.50	7.00	4.93	5.20	3.64	
536	Alkali blue	73,596	4.71	8.33	6.35	5.90	3.42	
543	Patent blue		10.78	8.68				
559	Victoria blue B		11.91	8.46	3.65	5.14	3.86	
566	Wool green S	164,581	6.98		5.95	4.99	1.88	
573	Rhodamine B		10.00	15.92	6.90	6.72		
587	Eosine	69,073	8.58	7.81	6.30	4.19	2.51	
606	Phosphine		6.00	6.00	3.86	4.17	3.70	
616	Primuline	129,281	4.43	3.04	1.71	1.59	1.37	
617	Columbia yellow	86,418	3.00	3.56	2.66	2.36	1.59	
626	Gallocyanine	140,064	5.96	5.12	3.03	3.06	2.44	
659	Methylene blue	209,395	3.09	2.80	3.03	2.94	1.94	
679	Safranine	52,771	5.93	5.85	4.02	3.88	2.60	
697	Induline (spirit soluble)	55,339	5.41	1.46	.53	1.21	.75	
698	Nigrosine (spirit soluble)	168,402	1.11	.71	.71	.88	.70	
699	Induline (soluble water)	92,988	1.51	.70	.67	1.03	.96	
700	Nigrosine (soluble in water)	626,706	.80	.63	.59	.72	.68	
	Sulphur yellow	316,399	.99	1.09	.83	.71	.73	
720	Sulphur black	7,832,696	.60	.37	.29	.25	.23	
	Sulphur blue	190,621	1.63	1.45	1.11	.98	.64	
725	Sulphur brown	1,159,115	.55	.48	.47	.35	.38	
	Sulphur tan	121,390	.90	.65	.34	.47	.59	
739	Sulphur maroon	230,773			1.23	1.62	.95	
763	Indanthrene dark blue B O	36,971				2.12	2.31	
778	Alizarin		3.38	1.95	1.58	1.45	.65	
779	Alizarin orange				1.45	1.46		
782	Alizarin brown	59,613	.88	.80	1.58	1.68	1.32	
842	Indanthrene blue G C D				6.96	2.40	2.41	
849	Indanthrene yellow				17.62	4.68	3.76	
874	Indigo synthetic	6,673,968	1.42	.88	.59	.74	.45	
877	Indigo extract	585,931	.38	.62	.64	1.00	.65	

Employees and Rates of Pay.

Reports were made by 170 of the 201 firms manufacturing coal-tar products concerning the number of employees receiving specified rates of pay on either December, 1921, or the nearest representative normal date for which this information could be obtained. The result of this report is contained in Tables 21 and 22. The 31 firms not reporting in most cases either conducted a business in which coal-tar products were not the primary articles of manufacture or did not have separately organized departments dealing with coal-tar products. The 170 firms reported a total of 13,292 employees, a decrease in number of 8,895 from that of 1920. The 1920 number of employees, in turn, represented a decrease of 2,549 from that of 1919. The chemists and technically trained men in 1921 totaled 1,722, or 12.9 per cent of all employees. In 1920 there were 2,551 chemists and technically trained men who made up 11.5 per cent of all employees. In 1921, of all chemists and technically trained men, 25.4 per cent received $50 but under $75 per week; 23.47 per cent received $75 per week and over; 9.2 per cent received $45 but under $50 per week; 9.5 per cent received $40 but under $45 per week; 9 per cent received $35 but under $40 per week. Of all men without technical training, 25.3 per cent received $20 but under $25 per week; 20.2 per cent received $25 but under $30 per week; and 16.7 per cent received $30 but under $35 per week.

In general, the wages of 1921 for both classes of men show a reduction from that of 1920, the percentage being small for chemists and technically trained men, whereas the decreased percentage for all other men without technical training was larger. Table 22 contains a comparison for the years 1920 and 1921 of specified rates of pay of technically trained men and men without such training. Among the technically trained men there was a decrease of about 5 per cent in each of the three classes receiving $30 to $35, $35 to $40, and $40 to $45 per week. Of all men without technical training there was a decrease of about 32 per cent in the two classes receiving $25 to $30 and $30 to $35 per week.

The Census of 1919 stated that the dye and coal-tar chemical industry has probably a larger proportion of technically trained men than will be found in any other manufacturing industry in the United States.

There is a striking contrast between the size of the industry in 1914 and in 1921. The Bureau of the Census reported for the calendar year 1914 that the number of employees engaged in the manufacture of coal-tar colors and other products totaled 528, divided as follows: Salaried employees, 130; wage earners (average number), 398. The total number of firms engaged in this industry during that year was 7.

TABLE 21.—*Employees and rates of pay in 1921.*

[Dye and coal-tar chemical industry.]

Wages per week.	Number of employees at each specified wage engaged in manufacturing operations.			Percentage receiving each specified wage.		Percentage r ing each sp wage or mo	
	Chemists and technically trained men.	Men without technical training.	All employees.	Of all chemists and technically trained men.	Of all men without technical training.	Of all chemists and technically trained men.	O m wit tech trai
Under $10		66	66		0.57	100.00	1
$10 but under $15	14	471	485	0.81	4.07		
$15 but under $20	45	1,994	2,039	2.61	17.23	99.19	
$20 but under $25	102	2,937	3,039	5.92	25.38	96.58	
$25 but under $30	106	2,341	2,447	6.16	20.24	90.66	
$30 but under $35	135	1,940	2,075	7.84	16.77	84.50	
$35 but under $40	155	802	957	9.00	6.93	76.66	
$40 but under $45	164	516	680	9.52	4.46	67.66	
$45 but under $50	159	214	373	9.23	1.85	58.14	
$50 but under $75	438	245	683	25.44	2.12	48.91	
$75 and over	404	44	448	23.47	.38	23.47	
Total	1,722	11,570	13,292	100.00	100.00		

TABLE 22.—*Comparison of employees and rates of pay, 1920 and 1921.*

[Dye and coal-tar chemical industry.]

Wages per week.	Percentage receiving each specified wage or more.					
	Of all chemists and technically trained men.			Of all men without tech cal training.		
	1921	1920	Decreased per-centage.	1921	1920	Dec p cen
$10 but under $15				99.4	99.9	
$15 but under $20	99.2	99.3	0.1	95.4	99.3	
$20 but under $25	96.6	97.1	.5	78.1	95.2	
$25 but under $30	90.7	94.3	3.6	52.8	84.8	
$30 but under $35	84.5	89.7	5.2	32.5	65.2	
$35 but under $40	76.7	81.8	5.1	15.7	36.9	
$40 but under $45	67.7	72.3	4.6	8.8	19.4	
$45 but under $50	58.1	55.4	[1] 2.7	4.4	10.2	
$50 but under $75	48.9	47.0	[1] 1.9	2.5	4.9	
$75 and over	23.5	20.8	[1] 2.7	.4	.2	

[1] Increase.

RESEARCH WORK.

Of the 201 firms engaged in the manufacture of dyes and other c tar chemicals, 68 had separately organized research laboratories for solution of technical problems in the manufacture of their produ and for the development or discovery of new products. Dur 1921 the net operating expenses of these laboratories, together w research work done in the laboratories not separately organized research, was $4,246,668. This includes salaries, apparatus, materials, after deducting the value of saleable products made in research laboratories. The figure for 1921 shows an increase $439,870 compared with 1920. This figure is doubtless an un statement of the real cost of experimental work, since it does

include, in all cases, the cost of research done as a part of manufacturing operations and not shown on the books of the companies as a charge against research.

The total reported cost of research in the coal-tar dye and chemical industry for the four years 1917-1921, was $19,373,407. With the exception of the year 1917, this is net, and does not include the value of saleable products made in experimental departments. In probably no other chemical field has there been so extensive and energetic investigation carried out as in the manufacture of dyes. The achievements of this period 1917–1921 must be attributed in no small part to the activity and liberal policy of the manufacturers in this field. Extended research is necessary for the development of a self-sustaining and competitive dye industry, and should be continued for the future welfare of the domestic industry.

Directory of manufacturers of coal-tar products during 1921.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
1	Abbott Laboratories	4753 Ravenswood Avenue, Chicago, Ill.
2	Agawam Chemical Works (Inc.)	531 Grosvenor Building, Providence, R. I. (North Attleboro, Mass.).
3	Albany Chemical Co	2-24 Broadway, Albany, N. Y.
4	Althouse Chemical Co	540 Pear Street, Reading, Pa.
5	Amalgamated Dyestuff & Chemical Works (Inc.).	Plum Point Lane, Newark, N. J.
6	American Aniline Products (Inc.)	80 Fifth Avenue, New York City (Lock Haven, Pa.).
7	American Chemical Products Co	73 Chatham Street, Rochester, N. Y.
8	American Nitration Co. (Inc.)	River Road, Nutley, N. J.
9	American Tar Products Co	208 South La Salle Street, Chicago, Ill. (St. Louis, Mo.; Carrollville, Wis.; Youngstown, Ohio.; Follansbee, W. Va.; Woodward, Ala.).
10	American Vat Color Co	3223 South Western Boulevard, Chicago, Ill.
11	Ansbacher & Co., A. B. (Inc.)	527 Fifth Avenue, New York City. (Brooklyn, N. Y.)
12	Arista Chemical Co. (Inc.)	305 Broadway, New York City. (Brooklyn, N. Y.)
13	Atlantic Chemical Works (Ltd.)	Bayway, N. J. (Elizabeth, N. J.)
14	Atlantic Dyestuff Co	88 Ames Building, Boston, Mass. (Portsmouth, N. H.)
15	Atlas Color Works	322 Ninth Street, Brooklyn, N. Y.
16	Baird & McGuire (Inc.)	Holbrook, Mass.
17	Barrett Co., The	40 Rector Street, New York City. (Plants distributed throughout the United States.)
18	Bayer Co. (Inc.), The	117 Hudson Street, New York City (Rensselaer, N.Y.).
19	Beaver Chemical Co. (Inc.)	Damascus, Va.
20	Beaver Manufacturing Co	Ballardvale, Mass.
21	Brooklyn Color Works (Inc.)	Stewart Avenue and Cherry Street, Brooklyn, N. Y.
22	Butterworth-Judson Corporation	61 Broadway, New York City. (Newark, N. J.)
23	Cabot (Inc.), Samuel	141 Milk Street, Boston, Mass. (Chelsea, Mass.)
24	Calco Chemical Co., The	Bound Brook, N. J.
25	Carey Manufacturing Co., The Philip	Lockland, Ohio.
26	Carus Chemical Co	La Salle, Ill.
27	Central Dyestuff & Chemical Co	Plum Point Lane, Newark, N. J.
28	Certain-teed Products Corporation	Boatman's Bank Building, St. Louis, Mo. (East St. Louis, Ill.)
29	Chatfield Manufacturing Co., The	Seventy-fourth and Lebanon Streets, Station P, Cincinnati, Ohio.
30	Chemical Company of America (Inc.), The.	46 Murray Street, New York City. (Springfield, N. J.)
31	Chester Chemical Corporation	36–40 Delevan Street, Brooklyn, N. Y.
32	Childs & Co., Charles M	41 Summit Street, Brooklyn, N. Y.
33	Chiris Co., Antoine	147 Waverly Place, New York City. (Delawanna, N. J.)
34	Cincinnati Chemical Works (Inc.)	Box 20, Evanston Station, Cincinnati, Ohio. (Norwood and St. Bernard, Ohio.)
35	Citizens Gas Co	Majestic Building, Indianapolis, Ind.
36	Coleman & Bell	Norwood, Ohio.
37	Commonwealth Chemical Corporation	15 Park Row, New York City. (Newark, Wayne County, N. Y.)
38	Commonwealth Color & Chemical Co	Nevins, Butler, and Baltic Streets, Brooklyn, N. Y.
39	Condensite Co. of America	Bloomfield, N. J. (Wyandotte, Mich.)
40	Consolidated Color & Chemical Co	122 Hudson Street, New York City. (Newark, N. J.)
41	Cooks Falls Dye Works (Inc.)	80 Maiden Lane, New York City. (Cooks Falls, N. Y.)
42	Coopers Creek Chemical Co	West Conshohocken, Pa.
43	Corona Chemical Division (Pittsburgh Plate Glass Co.).	213-215 Lake Street, Milwaukee, Wis.
44	Crescent Color & Chemical Works (Inc.)	Fifty-ninth Street and Eleventh Avenue, New York City. (Dunellen, N. J.)

Directory of manufacturers of coal-tar products during 1921—Continued.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
45	Croton Color & Chemical Co. (Inc.)	293 Broadway, New York City. (Croton-on-Hudson, N. Y.)
46	Denver Gas & Electric Light Co.	900 Fifteenth Street, Denver, Colo.
47	Dermatological Research Institute (Inc.).	1720 Lombard Street, Philadelphia, Pa.
48	Devoe & Raynolds Co. (Inc.)	101 Fulton Street, New York City. (Chicago, Ill.)
49	Diarsenol Co. (Inc.)	904 Ellicott Square, Buffalo, N. Y.
50	Dicks David Co. (Inc.)	19 North Moore Street, New York City. (Chicago Heights, Ill.)
51	Dissosway Chemical Co. (Inc.)	55 Eckford Street, Brooklyn, N. Y.
52	Dow Chemical Co., The	Midland, Mich.
53	du Pont de Nemours & Co., E. I.	1007 Market Street, Wilmington, Del. (Deepwater Point and Lodi, N. J.)
54	Dyanilin Chemical Co. (Inc.)	Box 216, New Brunswick, N. J.
55	Dye Products & Chemical Co. (Inc.)	200 Fifth Avenue, New York City. (Newark, N. J.)
56	Dyestuffs & Chemicals (Inc.)	11th and Monroe Streets, St. Louis, Mo.
57	Eakins (Inc.), J. S. & W. R.	24 Wallabout Street, Brooklyn, N. Y.
58	Eastman Kodak Co.	343 State Street, Rochester, N. Y. (Kodak Park Works, Rochester, N. Y.)
59	Essex Aniline Works (Inc.)	88 Broad Street, Boston, Mass. (South Middleton, Mass.)
60	Fine Colors Co. (Inc.)	21-29 McBride Avenue, Paterson, N. J.
61	Florasynth Laboratories (Inc.)	Olmstead and Starling Avenues, Unionport, N. Y.
62	Fries Bros.	92 Reade Street, New York City. (Bloomfield, N. J.)
63	Fries & Fries Co., The	1501 West Sixth Street, Cincinnati, Ohio.
64	Garfield Aniline Works (Inc.)	Midland Avenue, Garfield, N. J.
65	Gary Chemical Co.	738 Broadway, Gary, Ind. (Chesterton, Ind.)
66	Gaskill Chemical Corporation	157 Spencer Street, Brooklyn, N. Y.
67	Goodrich Co., The B. F.	Akron, Ohio (Akron Mill No. 3).
68	Grahame Chemical Co.	636 East State Street, Trenton, N. J.
69	Grasselli Chemical Co., The	1300 Guardian Building, Cleveland, Ohio. (Grasselli, N. J., Rensselaer, N. Y.)
70	Harmer Laboratories Co.	Baltimore and Hirst Avenues, East Lansdowne, Pa. (Lansdowne, Pa.)
71	Helena Light and Railway Co., The	Helena, Mont.
72	Heller & Merz Co., The	338 Wilson Avenue, Newark, N. J.
73	Herrmann & Co., Morris	200 Fifth Avenue, New York City. (Newark, N. J.)
74	Heyden Chemical Co. of America (Inc.)	Garfield, N. J.
75	Hind & Harrison Plush Co., The	Clark Mills, N. Y.
76	Hirsch Laboratories (Inc.), The	50 East Forty-first Street, New York City. (Brooklyn, N. Y.)
77	Holland Aniline Co.	Holland, Mich.
78	Holliday Kemp Co. (Inc.)	Betts Avenue and Queens Boulevard, Woodside, L. I., N. Y. (New York, N. Y.)
79	Hooker Electrochemical Co.	25 Pine Street, New York City. (Niagara Falls, N. Y.)
80	Hord Color Products Co., The	1636 Columbus Avenue, Sandusky, Ohio.
81	Hub Dyestuff & Chemical Co.	595 East Seventh Street, South Boston, Mass.
82	Hydrocarbon Chemical Co.	951 East Orange Street, Lancaster, Pa.
83	Hynson, Westcott & Dunning	Charles and Franklin Streets, Baltimore, Md.
84	Imperial Color Works (Inc.)	Glens Falls, N. Y.
85	Independent Coal Tar Co.	26 Broad Street, Boston, Mass. (Taunton, Mass.)
86	Indiana Dye & Chemical Co.	One Hundred and Fiftieth Street and Calumet Avenue, Hammond, Ind.
87	International Coal Products Corporation.	295 Fifth Avenue, New York City. (South Clinchfield, Va.)
88	Interstate Products Corporation	Bristol, Tenn.
89	Ising Corporation, The C. E.	Flushing, N. Y.
90	Jaenecke-Ault Co.	Avenue B and Wright Street, Newark, N. J.
91	Kem-O-Zone Laboratories (Inc.)	375 Ellicott Street, Buffalo, N. Y.
92	Kentucky Color & Chemical Co.	Thirty-fourth Street, South of Bank Street, Louisville, Ky.
93	Klipstein & Sons Co., E. C.	644 Greenwich Street, New York City. (Chrome, N. J.; South Charleston, W. Va., and Edgewater, N. J.)
94	Kohnstamm & Co., H.	87 Park Place, New York City. (Brooklyn, N. Y.)
95	La Motte Chemical Products Co.	13 West Saratoga Street, Baltimore, Md.
96	Lasher & Co. (Inc.), F. G.	104 Grove Street, Brooklyn, N. Y.
97	Lawrence Color & Chemical Works.	15 Merrimac Street, Lawrence, Mass.
98	Lee Co., A.	Lawrence, Mass. (Methuen, Mass.)
99	Lewis Manufacturing Co., F. J.	2513 South Robey Street, Chicago, Ill.
100	Lucas Paint Co., Alston	1031 Currier Street, Chicago, Ill.
101	Lucas & Co. (Inc.), John	322 Race Street, Philadelphia, Pa. (Gibbsboro, Camden Co., N. J.)
102	Mallinckrodt Chemical Works	3600 North Second Street, St. Louis, Mo.
103	Marietta Refining Co., The	Central Bank Building, Marietta, Ohio.
104	Marx Color & Chemical Co., Max	192-194 Colt Street, Irvington, N. J.
105	Massachusetts Department of Public Health.	Room 540, State House, Boston, Mass.
106	May Chemical Works	204 Niagara Street, Newark, N. J.
107	Mepham & Co., Geo. S.	Twentieth and Lynch Avenues, East St. Louis, Ill.
108	Merck & Co.	45 Park Place, New York City. (Rahway, N. J.)
109	Merrimac Chemical Co.	148 State Street, Boston, Mass. (North Woburn, Mass.)
110	Metz Laboratories (Inc.) H. A.	122 Hudson Street, New York City. (Brooklyn, N. Y.)
111	Monroe Drug Co.	Fourth and Oak Streets, Quincy, Ill.

Directory of manufacturers of coal-tar products during 1921—Continued.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
112	Monsanto Chemical Works	1724 South Second Street, St. Louis, Mo.
113	National Ammonia Co. of Penna., The	Delaware Avenue and Van Kirk Street, Philadelphia, Pa.
114	National Aniline & Chemical Co. (Inc.)	40 Rector Street, New York City. (Brooklyn, N. Y.; Buffalo, N. Y.; Marcus Hook, Pa.)
115	Naugatuck Chemical Co., The	Naugatuck, Conn.
116	Newport Co., The	1112 First Wisconsin National Bank Building, Milwaukee, Wis.
117	New England Aniline Works (Inc.)	95 Broad Street, Boston, Mass. (Ashland, Mass.)
118	New Haven Gas Light Co	New Haven, Conn.
119	New York Color & Chemical Co. (Inc.)	12 Gold Street, New York City. (Belleville, N. J.)
120	New York Quinine & Chemical Works	135 William Street, New York City. (Brooklyn, N. Y.)
121	Niagara Alkali Co	4205 Buffalo Avenue, Niagara Falls, N. Y.
122	Nitro Products Corporation	Nitro, W. Va.
123	Noil Chemical & Color Works (Inc.)	152 West One hundred and eighth Street, New York City.
124	Norvell Chemical Corporation, The	11 Cliff Street, New York City. (Perth Amboy, N. J.)
125	Palatine Aniline & Chemical Corporation.	81 North Water Street, Poughkeepsie, N. Y.
126	Peerless Color Co. (Inc.)	Bound Brook, N. J.
127	Pennsylvania Coal Products Co	Reiber Building, Butler, Pa. (Petrolia, Pa.).
128	Peoples Gas By-Products Corporation	122 South Michigan Avenue, Chicago, Ill. (Hawthorne, Ill.).
129	Pharma-Chemical Corporation	233 Broadway, New York City. (Bayonne, N. J.)
130	Pò Ambo Chemical Co. (Inc.)	Matawan, N. J.
131	Powers-Weightman-Rosengarten Co	916 Parrish Street, Philadelphia, Pa.
132	Providence Chemical Laboratories	51 Empire Street, Providence, R. I.
133	Radiant Dye & Color Works	2837 West Twenty-first Street, Brooklyn, N. Y.
134	Raritan Aniline Works	New Brunswick, N. J.
135	Redmanol Chemical Products Co	636 West Twenty-second Street, Chicago, Ill.
136	Reliance Aniline & Chemical Co. (Inc.)	15 William Street, New York City. (Poughkeepsie, N. Y.)
137	Republic Color & Chemical Works	P. O. box 533, Reading, Pa.
138	Republic Creosoting Co	1614 Merchants Bank Building, Indianapolis Ind. (St. Louis Park, Minn.; Seattle, Wash.; Mobile, Ala.)
139	Rhodia Chemical Co	89 Fulton Street, New York City. (New Brunswick, N. J.)
140	Ruxton (Inc.), Philip	220 West Forty-second Street, New York City. (247/253 Water Street, Brooklyn, N. Y.)
141	Sanborn Chemical Works	Putnam, Conn.
142	Secaw Chemical Co	525 Chancellor Avenue, Irvington, N. J.
143	Semet-Solvay Co	Syracuse, N. Y.
144	Seydel Manufacturing Co	78–100 Forrest Street, Jersey City, N. J.
145	Sherwin-Williams Co., The	Cleveland, Ohio. (Kensington, Chicago, Ill.)
146	Siegle Corporation of America, G	Rosebank, S. I., N. Y.
147	Siemon & Elting	93 Nassau Street, New York City. (Irvington, N. J.)
148	Sinclair & Valentine Co	11 St. Clair Place, New York City. (Edgewater, N. J.)
149	Sun Chemical & Color Co	309–321 Sussex Street, Harrison, N. J.
150	Synfleur Scientific Laboratories (Inc.)	Monticello, N. Y.
151	Synthetical Laboratories of Chicago	1326 West Congress Street, Chicago, Ill.
152	T. M. & G. Chemical Co	Belleville, N. J.
153	Tar Products Corporation	913 Turks Head Building, Providence, R. I. (East Providence, R. I.)
154	Texdel Chemical Co. (Inc.)	120 Maiden Lane, New York City. (Jersey City, N. J.)
155	Textile Chemical Co	Public Street and Allen's Avenue, Providence, R. I.
156	Thatcher Process Co. (Inc.)	523 Tracy Street, Syracuse, N. Y.
157	Tower Manufacturing Co. (Inc.)	326 Broadway, New York City. (Newark, N. J.)
158	Trico Chemical Co. (Inc.)	502 Iroquois Building, Buffalo, N. Y.
159	Ullman Co., Sigmund	Park Avenue and One hundred and forth-sixth Street, New York City.
160	Ultro Chemical Corporation	41 Union Square, New York City. (Brooklyn, N. Y.)
161	Uniform Color & Chemical Corporation	Market Street and Bertrand Avenue, Perth Amboy, N. J.
162	Van Dyk & Co	4 Platt Street, New York City. (Jersey City, N. J.)
163	Verona Chemical Co	26 Verona Avenue, Newark, N. J.
164	Warner-Jenkinson Co	2526 Baldwin Street, St. Louis, Mo.
165	Western Dry Color Co	Fifty-second and Wallace Streets, Chicago, Ill.
166	White Tar Co. of New Jersey (Inc.), The	56 Vesey Street, New York City. (Kearney, N. J.)
167	Wilbur White Chemical Co., The	Owego, N. Y.
168	Wilhelm Co., The A	Reading, Pa.
169	Will Corporation	845 Maple Street, Rochester, N. Y.
170	Williamsburg Chemical Co. (Inc.)	230 Morgan Avenue, Brooklyn, N. Y.
171	Wolf Co., Jacques	Passaic, N. J.
172	Wyoming Dyestuffs & Chemical Corporation.	P. O. box 12, Scranton, Pa.
173	Zinsser & Co	Hastings-on-Hudson, N. Y.
174	Zobel Co. (Inc.), Ernst	Second Avenue and Tenth Street, Brooklyn, N. Y.
175	Stearns & Co., Frederick	Jefferson and Bellevue Avenues, Detroit, Mich.

PART III.

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1921 CALENDAR YEAR.

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INTRODUCTORY.

Since 1919 the United States Tariff Commission has compiled a detailed census of dye imports similar to the Department of Commerce publication, Artificial Dyestuffs Used in the United States, of the fiscal year 1913 and 1914, which is commonly known as the Norton Import Census.

This information was first collected for use in the administration of section 501 of Title 5 of the act of September 8, 1916, making the specific duties on dyes and other finished coal-tar products after September 8, 1921, dependent upon whether as much as 60 per cent in value of the consumption of these products are being produced in the United States. Unfortunately, however, the provisions are not clear as to whether the domestic consumption is to be considered as a total consumption of each class of finished products or the consumption of individual items within the class. In either case there has been a lack of detailed information as to the importation of individual dyes, for years other than fiscal 1913 and 1914, this period being covered by Norton Census. The need of an import census of dyes has caused the Tariff Commission to continue this compilation for the year 1921, the information being of direct value to manufacturers, consumers, and importers. With the cooperation of the Treasury Department, invoices covering dye imports in the calendar year 1921, with the exception of those of the port of New York, were sent to the commission for tabulation. The statistics of dyes imported through the port of New York were obtained by transcribing the necessary information direct from the invoices in the files of the collector of the port of New York.

During the year 1920 the data for the import census included under the term "withdrawals" all withdrawals from entries made as far back as January 1, 1919. The collection for the warehouse withdrawals during 1921 differed from that of the previous year as follows: Withdrawals in the first place are not quite complete, due to the new system whereby a warehouse withdrawal is not entered in the statistical department of the warehouse entry division of the customhouse until all of the goods on that entry are taken from the warehouse. To illustrate, if an entry consists of 100 cases in the warehouse and 99 cases are withdrawn, there would be no record in the warehouse statistical books until the one-hundredth case, or the entire entry, had been withdrawn. To sum up, the withdrawals shown in this tabulation include (1) withdrawals which are complete and (2) nearly all of the withdrawals where only a part of the goods

has been taken from the warehouse. Owing to this new system mentioned in the above paragraph, in certain cases a limited number of withdrawals are not available where such withdrawals represent only a portion of the entire entry. From actual contact with the customhouse books and authorities this figure covering poundage withdrawn from warehouse, but not recorded as available, represents only a very small per cent of total warehouse withdrawals, which would be even a smaller per cent of total dyes entered for consumption.

The dyes imported were classified according to their chemical composition and tabulated according to the Schultz Farbstoff Tabellen (1914 edition); various types were also identified according to the Norton Census [1] as well as some other sources of information in the files of the Tariff Commission. Dyes identified by Norton as a, b, and c classes under a given Schultz number were included in that number in each case without special designation, with the exception of a few incorrectly designated dyes in that census. It is understood that such dyes included under these a, b, and c classes are not always chemically identical with the original Schultz types.

The Tariff Commission can not vouch for the accuracy of these classifications, as some identifications were supplied by dye experts and others by foreign manufacturers, and there was no opportunity to make a chemical examination of each dye imported. Those dyes which could not be identified by Schultz numbers were classified according to their ordinary method of application under the following groups: Acid, basic, direct, lake and spirit-soluble, mordant and chrome, sulfur, and vat dyes.

In many cases the classification of a dye by the class of application is arbitrary, as a color may be applied by two methods and hence could be grouped under either of two classes.

A small number of dyes not classified either by Schultz tables or by the method of application are listed by name under the heading of unclassified and unidentified dyes. The published value in English dyes include c. i. f. charges. In the case of Swiss dyes, however, all extra charges are included in every instance. The German invoices vary in the method used, but in most cases the extra charges are not included in the invoice values.

The rate of exchange used in converting the foreign invoice value to United States currency was either the rate given on the invoice or in a comparatively small number of cases the exchange value was used as published by the Treasury Department for that month in which consular certification occurred.

Summary of Imports of Dyes During 1921.

Table 24 shows the quantity and value of each individual dye imported during the calendar year 1921. Table 23 contains a summary of the dyes imported, classified into groups according to method of application.

The total import of coal-tar dyes during the calendar year 1921 was 3,914,036 pounds (as received), valued at $5,156,779, compared with 3,402,582 pounds, valued at $5,763,437, during the calendar year 1920,

[1] Norton, Thos. H., Artificial Dyestuffs Used in the United States, Department of Commerce, Special *Agents Series, No.* 121.

and 3,501,147 pounds during the fiscal year 1920. The value of the 1921 import of dyes is about one-half the value of the pre-war imports. The total quantity of dyes imported in 1921, in which most of the vat dyes are reduced to a single-strength basis, was 4,252,911 pounds. In comparing this 1921 poundage with that of 1920, allowance should be made for an increase of 338,875 pounds in the 1921 figure, due to the conversion for the first time of most of the vat dyes to a single-strength basis, in order to give the total poundage of any individual vat dye on a definite known basis of strength.

TABLE 23.—*Summary of dyes imported for consumption in the United States during the calendar years 1921 and 1920, classified by application.*

Class.	1921		1920	
	Pounds.	Per cent of total.	Pounds.	Per cent of total.
Acid	1,455,823	34.24	733,405	21.55
Vat:				
(a) Indigo	70,975	1.66	171,101	5.04
(b) Vat (other than indigo)	1,045,370	24.59	761,363	22.37
Total	1,116,345	26.25	932,464	27.41
Mordant and chrome:				
(a) Alizarin	136,283	3.58	73,252	2.16
(b) Mordant and chrome	559,678	12.78	636,230	18.71
Total	695,961	16.36	709,482	20.87
Direct	537,664	12.64	571,581	16.80
Sulfur	220,938	5.20	229,140	6.73
Basic	163,527	3.84	192,163	5.64
Spirit soluble and color lakes	43,553	1.02	17,527	.51
Unidentified, unclassified, special	19,100	.45	16,820	.49
Total	4,252,911	100.00	3,402,582	100.00

Table 24 shows the quantity and value of each individual dye imported during the calendar year 1921, and also the percentage of each, by the country of origin. In 1921 there were 379 Schultz types imported and over 1,300 different trade types. Of the total imports during 1921, 48.34 per cent, or 2,055,497 pounds, of these dyes originated in Germany. In 1920 Germany furnished 51 per cent. Swiss dyes totaled 40.53 per cent in 1921, or 1,723,281 pounds; England furnished 7.34 per cent, or 312,128 pounds; Italy, 2.7 per cent, or 115,009 pounds. The imports from Italy represented reexported reparation dyes of German manufacture. Dyes from Holland totaled 0.45 per cent, or 19,295 pounds, probably nearly all of German origin; France supplied 0.37 per cent, or 15,878 pounds. The imports of dyes from all other countries amounted to 0.27 per cent, or 11,823 pounds.

The imports in 1921 (as received) represent 10 per cent of the production during that year and 8.5 per cent of the imports during 1914, when the United States imported 45,950,895 pounds and produced 6,619,729 pounds from German-made intermediates. The dyes imported include those products which are either not yet manufactured in this country or are not yet produced in an adequate quantity or in a satisfactory quality to meet all special requirements.

The average invoice price of dyes imported in 1921, as received was $1.32 per pound, as compared with $1.70 per pound for 1920 and about 22 cents per pound for 1914. This large increase in unit value of the postwar imports compared with the pre-war imports is due to several reasons: (1) The increased export values of dyes shipped from Germany, (2) the tendency to ship higher concentration colors in recent years compared with the pre-war standards, and (3) the dyes imported in the years 1919 to 1921 represent, for the most part, the more expensive products which either have not been made in this country at all or have not been made on satisfactory terms as to quality, delivery, or price. For these reasons the pre-war average invoice value of about 22 cents per pound is not comparable with the 1921 average invoice value of $1.32 per pound.

An examination of Table 23, containing a summary of dyes imported for consumption, classified by method of application, shows that the acid dyes made up the largest class imported, totaling 1,455,823 pounds, or 34.24 per cent of the total imports. In 1920 this class constituted 21.5 per cent of the total imports. A part of the increase of this class is due to the fact that certain acid dyes derived from alizarin, commonly used as acid dyes, were classified under the acid class instead of under the mordant and chrome colors, as was the case in 1920. The second class, in view of quantity imported, were the vat dyes, which totaled 1,116,345 pounds, or 26.25 per cent of the total imports. The vat dyes, other than indigo, amounted to 1,045,370 pounds, or 24.59 per cent of the total, which is three times domestic production of 1921. The mordant and chrome dyes rank third in quantity, with a total of 695,961 pounds, or 16.36 per cent of the total import, this group being further divided into (1) alizarin, 136,283 pounds, and (2) mordant and chrome colors with a total of 559,678 pounds. The importation of direct cotton colors was 537,664 pounds, or 12.64 per cent of all dyes imported. The remaining classes, which were imported in relatively small amounts, are: Sulfur dyes, 220,938 pounds, or 5.2 per cent of all dyes imported; basic dyes, 163,527 pounds, or 3.84 per cent; spirit-soluble and color lake dyes, 43,553 pounds, or 1.02 per cent. The total imports of unclassified and unidentified dyes were 19,100 pounds, or 0.45 per cent.

Returning to a consideration of the acid dyes, Wool Blue R L, which is not produced in this country, was first, with a total import of 69,719 pounds. Xylene Light Yellow was second in quantity, with an import of 60,422 pounds. The imports of Sulphoncyanine and Wool Green S each amounted to nearly 52,000 pounds. Patent blue ranks fifth, with an import of 42,718 pounds. Tartrazine, although produced in the United States to the extent of 559,134 pounds, showed an import of 38,395 pounds. Alizarin direct green G was produced in this country, for the first time, in 1922; the 1921 import was 36,534 pounds. Acid dyes imported in a quantity varying from 21,898 to 28,606 pounds, included Alizarin Saphirol B, Cloth Fast Blue, Fast Light Yellow, Fast Green, Alizarin Astrol, Quinoline Yellow.

In the class of vat dyes (other than indigo), Indanthrene Blue G C D, the most important vat dye other than indigo, led with a total import (single strength basis) of 201,835 pounds. In 1914 when this color was exclusively imported from Germany the imports were 478,980 pounds. Hydron Blue ranks second in quantity imported,

namely, 146,072 pounds. Ciba Blue 2 B ranked third, with an import of 99,937 pounds. Indigo, although produced in large quantity in this country, was imported to the extent of 70,975 pounds. This figure is compiled by the Department of Commerce, and it is possible that it may include brominated indigos. Other vat dyes imported in substantial amounts are Indanthrene Golden Orange R, 56,390 pounds; Indanthrene Violet 2 R, 52,083 pounds; Indanthrene Yellow, 49,609 pounds; Indanthrene Golden Orange G, 33,423 pounds; Helindone Pink (not produced in this country), 31,813 pounds. The following vat dyes varied in quantity imported from 14,000 to 29,000 pounds each: Indanthrene Blue 3 G; Algol Red R F F; Indanthrene Blue R S; Helindone Brown A N; Ciba Violet B; Indanthrene Red B N; Helindone Red 3 B.

Of the mordant and chrome dyes, Erio Chrome Black A showed the largest individual import of any dye, namely, 224,002 pounds; Alizarin was second in quantity of all dyes imported, with a total of 136,283 pounds. Erio Chrome Black T, with an import of 132,388 pounds, ranks third in quantity imported. Anthracene Blue W R followed with an import in 1921 of 107,769 pounds, compared with 103,913 pounds for 1920, during which year this color constituted the largest import of any dye of the mordant and chrome class. Other dyes of this class which showed imports varying from 15,000 to 43,000 pounds, include in their order of quantity imported: Alizarin Blue Black, Erio Chrome Blue Black, Alizarin Black, Alizarin Blue, Alizarin Brown, Alizarin R G, G I; Alizarin Red, and Gallamine Blue.

The imports of direct cotton dyes included a large number of dyes: Trisulphon Brown led with an import of 38,558 pounds, followed by Trisulphon Brown 2 G, with an import of 22,872 pounds. Diaminogen Blue, used as a developed dye, ranked third, with an import of 17,308 pounds. Direct cotton dyes showing an import of from 7,000 to 13,000 pounds include: Chicago Blue 6 B, Diamine Scarlet, Benzo Fast Scarlet, Congo Fast Blue, Diaminogen, and Chrysamine. Carbide Black E, a type of Direct Deep Black, showed an import of 11,102 pounds.

The sulfur dyes constituted only 5 per cent of the dyes imported. These imports comprise a comparatively small number of dyes. Cross dye green, for which there is no domestic equivalent in brilliancy, led with an import of 51,074 pounds. Thionol Yellow had an import of 35,240 pounds; followed by Eclipse Brown with an import of 21,248 pounds, and Thionol Brown, with an import of 20,632 pounds. Other sulfur dyes showing imports varying from 6,500 to 16,000 pounds include Thionol Green D Y, Pyrogene Blue, Thionine Green G G, and Katigene Green.

Basic colors made up 3.84 per cent of the imports; the total for this group was 163,527 pounds. The more important basic dyes imported are Auramine, with a total of 35,532 pounds; Phosphine, 21,153 pounds; Victoria Blue B, 12,342 pounds; Rhodamine B and G, with an individual import of slightly over 10,000 pounds.

Symbols denoting manufacturer.—In the table of imports of dyes under the heading "manufacturer" is shown a symbol for each dye, which refers to the following list of manufacturers in foreign countries:

1. THE SIX LEADING GERMAN COMPANIES.

A.....Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.
B.....Badische Anilin- und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.
By.....Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.
C.....Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.
K.....Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branch in Russia.
M.....Farbwerke vorm. Meister Lucius & Brüning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2. THE SEVEN SMALLER GERMAN COMPANIES.

BK.....Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.
CG.....Chemikalienwerk Greisheim G. m. b. H., Griesheim on the Main. Founded 1881.
CJ.....Carl Jäger G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.
GrE.....Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.
L.....Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.
tM.....Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.
WD.....Wülfing, Dahl & Co., A. G. Barmen. Founded 1842.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES.

FA.....Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF.....Niederlandische Farben- und Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897. Branch in Russia.
LG.....Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgiam.)
P.....Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL.

DH.....Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
G.....Anilinfarben- und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany, and Russia.
I.....Gesellschaft fur chemische Industrie. Founded 1885. Branch in France.
S.....Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES.

ClCo.....The Clayton Aniline Co. (Ltd.), Clayton, near Manchester. Founded 1876.
CR.....Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.
CV.....Colne Vale Chemical Co., Milnsbridge, near Huddersfield.
RHS.....Read Holliday & Sons (Ltd.), Huddersfield. Founded 1830. (Purchased by British Dyes (Ltd.).)
BD.....British Dyes (Ltd.). Founded 1915.
Lev.....Levinstein (Ltd.), Crumpsall Vale, near Manchester. Founded 1864.
Q.....Importations of unknown source, through dealers in colors.

TABLE 24.—*Imports of dyes during the calendar year 1921.*

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
	Total		*Pounds.* 4,252,911	$5,156,779	Germany, 48.34 per cent; Switzerland, 40.53 per cent; England, 7.34 per cent; Italy, 2.70 per cent; Holland, 0.45 per cent; France, 0.37 per cent; all other countries, 0.27 per cent.
4	Naphthol green		190		Germany, 100 per cent.
	Naphthol green B	C			
7	Naphthol yellow		80		England, 100 per cent.
	Naphthol yellow S	Q			
9	Direct yellow		544		Germany, 100 per cent.
	Naphthamine yellow BN	K			
	Naphthamine yellow G	K			
16	Curcuphenine	CLCO	1,000		England, 100 per cent.
18	Diphenyl fast yellow		2,204		Switzerland, 100 per cent.
	Diphenyl chlorine yellow FF supra 287.	G			
19	Fast light yellow		23,315	36,989	Germany, 54 per cent; Switzerland, 46 per cent.
	Erio flavine SX	G			
	Fast light yellow G	By			
	Fast light yellow G 10526	By			
	Fast light yellow G P1-10526	By			
	Fast light yellow G VIII 10526	By			
	Fast light yellow G conc. 80-100 10526a.	By			
	Fast light yellow 2GN	By			
	Fast light yellow 3G 1110	By			
	Fast light yellow 3G conc	By			
	Fast light yellow 3G conc. 75-100 10528B.	By			
	Fast light yellow RG	By			
	Fast light yellow GGN 10531 P111.	By			
	Flavazine L	M			
20	Flavazine S		6,096		Germany, 100 per cent.
	Flavazine S	M			
22	Xylene light yellow		60,422	99,737	Switzerland, 100 per cent.
	Xylene light yellow GG	S			
	Xylene light yellow 2G	S			
	Xylene light yellow 2G conc.	S			
	Xylene light yellow R	S			
23	Tartrazine		38,395	46,541	Switzerland, 90 per cent; Germany, 9.9 per cent; England, 0.1 per cent.
	Tartrazine XX	B			
	Tartrazine conc	S			
	Tartrazine conc. pure	S			
	Tartrazine N	RHS			
	Tartrazine brown B	S			
25	Dianil yellow 3G	M	100		Germany, 100 per cent.
28	Hansa yellow G		2,725		Do.
	Hansa yellow G	M			
	Hansa yellow G lumps	M			
29	Erio chrome red		1,102		Switzerland, 100 per cent.
	Erio chrome red B 915	G			
37	Croceine orange		198		Germany, 100 per cent.
	Croceine orange X	C			
38	Orange G		320		Do.
	Orange GG crystals	C			
42	Amido naphthol red G		14,130		Switzerland, 100 per cent.
	Erio floxine 2G conc. 575	G			
	Erio floxine 6B conc. 576	G			
45	Brilliant lake red R		10,000		Germany, 100 per cent.
	Brilliant lake red R paste	M			
56	Autol red		2,694		Do.
	Pigment red B paste	M			
	Pigment red G powder	M			
60	Azophosphine GO		423		Do.
	Azophosphine GOK	M			
61	Victoria violet		2,230	1,263	Switzerland, 67 per cent; Germany, 33 per cent.
	Victoria violet 4BS	S			
	Victoria violet 4BS	M			
	Victoria violet 4BSL	M			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
61	Victoria violet—Continued.				
	Azo wool blue SEX	C			
	Azo wool blue S	C			
63	Azo acid blue		4,425		Switzerland, 100 per cent.
	Azo acid blue B	S			
64	Lanafuchsine		402		Germany, 100 per cent.
	Lanafuchsine BBS	C			
	Lanafuchsine SG	C			
66	Amido naphthol red 6B		200		Do.
	Amido naphthol red BB	M			
73	Helio fast red		1,111		Do.
	Helio fast red RL powder	By			
81	Brilliant cochineal		412		Do.
	Brilliant cochineal 4R	C			
82	Ponceau R	M	1,298		Do.
83	Ponceau 3R		242		Germany, 79 per cent; E land, 21 per cent.
	Ponceau X	K			
	Ponceau 4R	Q			
85	Omega chrome black		1,001		Switzerland, 100 per cent.
	Omega chrome black P conc.	S			
86	Azarine S	M	511		Germany, 100 per cent.
87	Peri wool blue		300		Do.
	Peri wool blue B	C			
88	Acid anthracene brown		9,028	$5,138	Do.
	Acid anthracene brown R	By			
	Acid anthracene brown R 11051.	By			
	Acid anthracene brown R 11051 (1X).	By			
	Acid anthracene brown RH, extra.	By			
	Acid anthracene brown RH, extra 11055.	By			
	Acid anthracene brown RH, extra 11055 Pl.	By			
	Acid anthracene brown WSG 27423.	By			
	Acid anthracene brown RR, extra (11055).	By			
92	Metachrome Bordeaux R		342		Do.
	Metachrome Bordeaux B	A			
93	Sudan R		1,285		Do.
	Pigment purple A paste	M			
113	Crystal ponceau		159		Do.
	Crystal ponceau 6R	K			
118	Geranine		4,034	1,030	Do.
	Geranine G	By			
	Geranine G 295	By			
	Brilliant Geranine G	By			
119	Diamine rose		1,491	221	Do.
	Diamine rose FFB	C			
	Diamine rose FFB, extra	C			
	Diamine rose G	C			
121	Erica B		2,802	7,860	Germany, 58 per cent; S zerland, 42 per cent
	Erica B extra	A			
	Erica BN	A			
	Erica B conc	S			
126	Indoine blue R		709	211	Germany, 100 per cent.
	Indoine blue BB	B			
	Naphthindon BB	C			
	Naphthindon	C			
132	Lake red P		6,000		Do.
	Lake red P paste	M			
133	Erio chrome phosphine R		2,347		Switzerland, 100 per cent.
	Erio chrome phosphine RR 958.	G			
134	Metanil yellow		3,637		Do.
	Metanil yellow	Q			
	Metanil yellow	I			
139	Orange IV		220		Do.
	Orange IV powder 522	G			
140	Curcumeine		3,681		Do.
	Jasmine high conc. 729	G			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
141	Azo yellow		15,118	$12,534	Switzerland, 99 per cent; Germany, 1 per cent.
	Helianthine G FF 731	G			
	Helianthine G 751	G			
	Azo yellow I	I			
	Azo yellow G	K			
152	Permanent red 4B		4,134	6,914	Germany, 100 per cent.
	Lithol rubine BN powder	B			
	Permanent red extra powder	A			
	Permanent red R extra powder.	A			
	Permanent red 4B extra powder.	A			
154	Palatine chrome brown		900		Do.
	Palatine chrome brown RX	B			
158	Chrome brown RR		794		Switzerland, 100 per cent.
	Chrome brown RVV 899	G			
159	Acid alizarin black		3,808	3,559	Switzerland, 97 per cent; Germany, 3 per cent.
	Acid alizarin black R	I			
	Acid alizarin black R	M			
	Acid alizarin black R	S			
161	Fast red		602		Germany, 100 per cent.
	Fast red S	M			
163	Azo acid rubine B	K	218		Do.
164	Diamond blue R		1,455		Do.
	Diamond blue R 10043 (P1)	By			
168	Amaranth		520		Do.
	Amaranth	C			
	Naphthol red EB	C			
177	Mordant yellow		1,239		Do.
	Milling yellow O	M			
	Mordant yellow	M			
	Salicine yellow L	K			
180	Erio chrome blueblack BC		38,226		Switzerland, 100 per cent.
	Erio chrome blueblack BC 926.	G			
	Erio chrome blueblack G 925	G			
181	Salicine black U		3,532	309	Germany, 100 per cent.
	Salicine black U	K			
	Salicine black C conc	K			
	Salicine black D	K			
	Salicine black UL	K			
	Anthracene blue black BE	C			
182	Brilliant sulphon red		7,235	10,163	Switzerland, 100 per cent.
	Brilliant sulphon red B	S			
	Brilliant sulphon red 10B	S			
	Fast sulphon violet 5BS	S			
183	Erio chrome black T conc		132,388		Do.
	Erio chrome black T 934	G			
184	Erio chrome black A		224,002		Do.
	Erio chrome black A 922	G			
185	Anthracene chrome black		2,196	522	Germany, 100 per cent.
	Anthracene chrome black 5B	C			
	Anthracene chrome black FE.	C			
	Anthracene chrome black PF.	C			
	Anthracene chrome black PPN extra.	C			
198	Thiazol yellow		6,945		Switzerland, 100 per cent.
	Thiazol yellow G conc	S			
	Mimosa Z conc 331	G			
207	Diphenyl fast brown GNC		969		Do.
	Diphenyl fast brown GNC129	G			
	Diphenyl fast brown G F 365	G			
211	Resorcine brown		300		Germany, 100 per cent.
	Resorcine brown F	K			
212	Acid brown		1,542		Switzerland, 100 per cent.
	Acid brown RN 532	G			
217	Agalma black 10B		1,870	263	Germany, 100 per cent.
	Agalma black 10BX	B			
	Naphthol blue black	C			
	Naphthol blue black S	C			
	Naphthol blue black pure	C			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
218	Nigrophor		1,000		Germany, 100 per cent.
	Nigrophor	B			
220	Palatine black		14,850	$9,870	Do.
	Wool black 6B	A			
	Wool black GRF	A			
	Wool jet black 3B (old type)	A			
221	Anthracene acid brown		889		Do.
	Anthracene acid brown G	C			
222	Janus yellow		1,770		Do.
	Janus yellow G	M			
223	Sudan III		525		Do.
	Cerasine red B	C			
227	Brilliant croceine		2,339	2,191	Germany, 51 per cent; It 49 per cent.
	Brilliant croceine 3B	C			
	Brilliant croceine 3BA	By			
	Brilliant croceine M	C			
	Brilliant croceine M 85–100	C			
	Cotton scarlet extra	B			
240	Janus red B		400		Germany, 100 per cent.
	Janus red B	M			
241	Neutral gray G		188		Do.
	Diamine gray G	C			
247	Scarlet		518		Do.
	Scarlet MS	C			
257	Sulphon cyanine		51,989	77,356	England, 81 per cent; many, 19 per cent.
	Sulphon cyanine GR extra	By			
	Coomassie navy blue 2RN	BD			
	Alphanol blue 3RN	C			
260	Erio chrome verdon		2,667		Switzerland, 100 per cent
	Erio chrome verdon S	G			
	Erio chrome verdon S1042	G			
265	Sulphon cyanine black		615		Germany, 100 per cent.
	Tolyl black BGII	M			
266	Naphthylamine black		587	76	Do.
	Naphthylamine black 4B	C			
	Naphthylamine black 4BS	C			
	Naphthylamine black ESN	C			
	Naphthylamine black S	C			
	Naphthylamine black 4BX	B			
268	Naphthyl blue black N	C	123		Do.
269	Acid black		1,705		Do.
	Blue black solido O	M			
270	Brilliant croceine 9B		362		Do.
	Brilliant croceine 9B	C			
272	Brilliant black		513		Do.
	Naphthol black P	C			
	Naphthol black BD	C			
273	Diaminogene blue		19,182	16,529	Germany, 98 per cent; It 2 per cent.
	Diaminogene blue BB	C			
	Diaminogene blue NA	C			
	Diaminogene blue NB	C			
274	Diaminogene		7,864	10,053	Germany, 94 per cent; It 6 per cent.
	Diaminogene B	C			
	Diaminogene extra	C			
	Diazo indigo blue BR extra	By			
	Diazo indigo blue 2RL	By			
	Diazo indigo blue 2RL 1221	By			
	Diazo indigo blue 2RL 10417	By			
	Diazo indigo blue 2RL 10417 (VII)	By			
	Diazo indigo blue 2RL conc. 70–100 10417 a	By			
	Diazo indgo blue 2RL conc. 70–100 10417 a (VII)	By			
	Diazo indigo blue 3RL	By			
	Diazo indigo blue 3F L conc. 50–100 10418 a (VII)	By			
	Zambesi pure blue 4B	A			
275	Diamond black		6,570	1,037	Germany, 91 per cen Switzerland, 9 per cen
	Fast mordant black B	M			
	Fast mordant black FH	M			
	Fast mordant black T	M			
	Diamond black FB	By			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
276	Diamond green		2,117		Germany, 100 per cent.
	Diamond green SS	K			
	Diamond green SS 10980 (P1).	By			
277	Anthracene acid black		1,576		Do.
	Anthracene acid black DSF.	C			
	Anthracene acid black DSF extra.	C			
	Anthracene acid black DSFB	C			
	Anthracene acid black ST	C			
279	Benzo fast scarlet		10,973	$13,835	Germany, 76 per cent; Switzerland, 20 per cent; England, 4 per cent.
	Benzo fast scarlet 4BA 10024.	By			
	Benzo fast scarlet 4BS 1024.	By			
	Benzo fast scarlet 4BS 10020 (VI).	By			
	Benzo fast scarlet 4BS 10020 (P1).	By			
	Benzo fast scarlet 4BS conc.	By			
	Benzo fast scarlet 4BS conc. 75-100 10020a.	By			
	Benzo fast scarlet 4BS conc. 75-100 10020a (VI).	By			
	Benzo fast scarlet 5BS 1161.	By			
	Benzo fast scarlet 5BS 10021.	By			
	Benzo fast scarlet 7BS	By			
	Benzo fast scarlet 8BS 10023.	By			
	Benzo fast scarlet 8BS 10023 (P1).	By			
	Benzo fast scarlet GS	By			
	Benzo fast scarlet GS 10019 (P1).	By			
	Direct fast scarlet SE conc	I			
	Dianol fast red K	BD			
283	Bismark brown		1,338		Germany, 100 per cent.
	Bismark brown GG	C			
293	Milling red		2,655		Switzerland, 100 per cent.
	Acid milling red G conc. 631.	G			
294	Fast mordant yellow		531		Germany, 100 per cent.
	Anthracene yellow C powder.	C			
	Fast mordant yellow G powder.	B			
296	Cotton yellow		2,403	4,321	Do.
	Cotton yellow GI	B			
	Benzo fast yellow 4GL extra.	By			
	Benzo fast yellow 4GL extra 1565.	By			
	Benzo fast yellow 4GL extra 10102.	By			
	Benzo fast yellow RL	By			
	Benzo fast yellow RL 28168.	By			
	Diamine fast yellow 3G	C			
	Cotton yellow GX	B			
297	Benzo fast pink 2BL		22		Do.
	Benzo fast pink 2BL	By			
304	Chrysophenine		1,300		Switzerland, 100 per cent.
	Chrysophenine conc	S			
306	Pyramine orange 3G		537		Germany, 100 per cent.
	Pyramine orange 3G	B			
	Pyramine orange 3GX	B			
315	Congo orange		258		Do.
	Congo orange G	By			
316	Brilliant congo G	A	77		Do.
319	Diamine scarlet		12,399	15,575	Germany, 53 per cent; Switzerland, 45 per cent; Holland, 2 per cent.
	Diamine scarlet B	C			
	Diamine scarlet B 130 per cent.	C			
	Diamine scarlet 3B	C			
	Diamine scarlet 3B	Q			
	Diamine scarlet 3B 120 per cent.	C			
	Diamine scarlet HS	C			
	Diamine scarlet HS	Q			
	Chloramine red B	S			
	Chloramine red 3B	S			
	Diamine brilliant Bordeaux R.	C			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
322	Trisulphon violet B		5,504		Switzerland, 100 per cent.
	Trisulphon violet B	S.			
326	Oxy diamine violet		1,910	$291	Germany, 100 per cent.
	Oxamine violet	B.			
	Naphthamine violet BE	K.			
	Benzo violet R 10196	By.			
	Benzo violet	By.			
	Benzo violet O	By.			
329	Diamine brown V		282		Do.
	Diamine brown V	C.			
330	Zambesi brown		403		Do.
	Zambesi brown 4R	A.			
332	Benzo fast red		6,046	9,507	Germany, 95 per cent; Holland, 5 per cent.
	Benzo fast red 8BL	By.			
	Benzo fast red 8BL 10018	By.			
	Benzo fast red 8BL 10018 (V1)	By.			
	Benzo fast red 9BL	By.			
	Benzo fast red 9BL 10043 (P1)	By.			
	Benzo fast red L	Q.			
333	Diamine black		2,265		Switzerland, 97 per cent; Germany, 3 per cent.
	Diamine black R. M. W	C.			
	Chloramine black B. H. conc. double.	S.			
334	Diphenyl blue black double		551		Switzerland, 100 per cent.
	Diphenyl blue black double	G.			
335	Naphthamine black		772		Germany, 100 per cent.
	Naphthamine black CE	K.			
	Naphthamine black CET (U4).	K.			
338	Naphthamine blue		376		Germany, 100 per cent.
	Naphthamine blue 3R	K.			
	Naphthamine blue 7R	K.			
340	Benzo orange R	S.	500		Switzerland, 100 per cent.
342	Chrysamine		7,815		Do.
	Chrysamine K	S.			
343	Diamine fast red		6,049	9,070	Switzerland, 67 per cent; Germany, 33 per cent.
	Diamine fast red 8BL	C.			
	Diamine fast red 8BL 140 per cent.	C.			
	Diphenyl fast red B supra 340	G.			
	Chloramine fast red F	S.			
	Benzo fast red FC	By.			
	Dianil fast red PH	M.			
344	Diamine brown		635		Germany, 100 per cent.
	Diamine brown ATC	C.			
	Diamine brown 3G	C.			
346	Oxamine red		2,668		Do.
	Oxamine red	B.			
	Oxamine red X	B.			
349	Diamine brown B		208		Do.
	Diamine brown B	C.			
	Diamine brown B	K.			
352	Direct violet R	I.	2		Switzerland, 100 per cent.
354	Direct gray R		11,155		Do.
	Direct gray R paste 1022	G.			
355	Anthracene acid red		336		Do.
	Anthracene acid red 3B	Q.			
358	Diphenyl red		4,036		Switzerland, 74 per cent; Italy, 19 per cent; Germany 7 per cent.
	Diphenyl red SC 373	G.			
	Toluylene red	GrE.			
360	Pyramine orange R	B.	856		Germany, 100 per cent.
363	Benzopurpurine 4B		621		Do.
	Benzopurpurine 4B	K.			
	Cotton fast red 4BSP	B.			
364	Diazo brilliant black		751		Italy, 53 per cent; Germany, 47 per cent.
	Diazo brilliant black B	By.			
	Diazo brilliant black B 487	By.			
366	Delta purpurine		727		Germany, 100 per cent.
	Delta purpurine 5B extra Indian.	By.			
368	Brilliant purpurine 4B		1,243		Do.
	Brilliant purpurine 10B	A.			
370	Brilliant congo		1,273	1,450	Switzerland, 52 per cent; Germany, 48 per cent.
	Brilliant congo R	A.			
	Brilliant congo R 10012 (P1)	By.			
	Brilliant congo R	S.			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
373	Congo orange		500		Germany, 100 per cent.
	Congo orange R	A			
388	Chicago blue R	A	101		Do.
392	Toluylene orange		523		Do.
	Toluylene fast orange GL	By			
	Toluylene fast orange GL 10082.	By			
	Toluylene fast orange GL 10082E.	By			
400	Acid anthracene red		6,120	$2,025	Do.
	Acid anthracene red 3B	By			
	Acid anthracene red G	By			
	Acid anthracene red 2BL 1949	By			
404	Diamine yellow N		1,327		Do.
	Diamine yellow N 110 per cent.	C			
410	Benzo azurine G	K	112		Do.
413	Direct violet BB		2		Switzerland, 100 per cent.
	Direct violet 2B	I			
418	Diamine brilliant blue G		100		Germany, 100 per cent.
	Diamine brilliant blue G	K			
424	Chicago blue 6B		18,418	52,652	Switzerland, 98 per cent; Germany, 2 per cent.
	Brilliant benzo blue 6B 10134 (P1).	By			
	Chloramine sky blue FF	S			
	Chloramine sky blue BB X FF.	S			
	Direct sky blue green shade	I			
	Direct sky blue green shade conc.	I			
426	Benzamine pure blue		1,001		Switzerland, 100 per cent.
	Chloramine sky blue A conc	S			
431	Diamine gold	C	146		Germany, 100 per cent.
432	Diamine cutch		1,225	334	Do.
	Diamine cutch	C			
	Diamine cutch 2475	C			
	Diamine cutch 20495	C			
436	Columbia black		5,512		Do.
	Columbia black FF extra	A			
448	Diamine bronze R		2,116		Do.
	Diamine bronze G	C			
449	Trisulphon brown		38,558		Switzerland, 100 per cent.
	Trisulphon brown B	S			
	Trisulphon brown MB	S			
451	Congo fast blue		9,259		Germany, 96 per cent; Switzerland, 4 per cent.
	Congo fast blue R extra	A			
	Chlorantine fast blue RL conc.	I			
456	Benzo fast blue		3,768	7,125	Germany, 98.4 per cent; Italy, 1.6 per cent.
	Congo fast blue B	A			
	Benzo fast blue 2GL	By			
	Benzo fast blue 4GL	By			
	Benzo fast blue 4GL 1854	By			
	Benzo fast blue 4GL 10185	By			
	Benzo fast blue 4GL 10185 (P1).	By			
	Benzo fast blue 4GL 10185 (V1).	By			
457	Trisulphon brown GG		22,872	30,477	Switzerland, 100 per cent.
	Trisulphon brown GG	S			
	Trisulphon brown GG conc	S			
	Trisulphon brown GG conc	G			
458	Naphthamine direct black		2,083	152	Germany, 100 per cent.
	Naphthamine direct black AK.	K			
	Naphthamine direct black EK.	K			
	Naphthamine direct black EK extra A.	K			
	Naphthamine direct black ERK extra.	K			
	Naphthamine direct black FFK extra.	K			
	Naphthamine direct black GNM.	K			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
458	Naphthamine direct black—Con.				
	Naphthamine direct black RWK.	K			
	Naphthamine direct black RWK extra A.	K			
462	Direct deep black		11,102		Switzerland, 100 per cent.
	Carbide black E conc	I			
467	Diphenyl green G		2,204		Do.
	Diphenyl green KGW supra 288.	G			
469	Chloramine black		2,602		Do.
	Chloramine black extra conc.	S			
	Chloramine black extra conc. pure.	S			
471	Chloramine blue 3G	S	1,102		Do.
473	Diamine black HW		370		Germany, 100 per cent.
	Diamine black HW	C			
475	Oxamine green C		806		Switzerland, 100 per cent.
	Direct green G	S			
	Chloramine G	S			
477	Congo brown		551		Germany, 100 per cent.
	Naphthamine brown H	K			
493	Auramine		35,532	$57,300	Switzerland, 91 per cent; England, 6 per cent; Germany, 3 per cent.
	Auramine	LG			
	Auramine	I			
	Auramine 4183	Q			
	Auramine pure	B			
	Auramine conc	B			
	Auramine O	K			
	Auramine O	S			
	Auramine O	I			
	Auramine OO	I			
	Auramine OE	G			
495	Malachite green		2,525		Germany, 100 per cent.
	Solid green	M			
	Malachite green small crystals.	Q			
496	Setoglaucine		485		Switzerland, 100 per cent.
	Setoglaucine 753	G			
497	Victoria green BXX	B	77		Germany, 100 per cent.
498	Turquoise blue		46		Germany, 52 per cent; France, 48 per cent.
	Turquoise blue BB 569	By			
	Turquoise blue Q	Q			
499	Brilliant green		4,927		Germany, 100 per cent.
	Brilliant green extra conc. small crystals.	Q			
	Brilliant green crystals extra.	M			
502	Guinea green		150		Do.
	Acid green B	C			
503	Neptune green		7,402	16,063	Switzerland, 55 per cent; Germany, 45 per cent.
	Neptune green SBLX	B			
	Neptune green SGX	B			
	Brilliant acid green 6B 11653B (VIII).	By			
	Brilliant acid green 6B conc. 60–100 11653A.	By			
	Brilliant acid green 6B conc. 65–100 11653.	By			
	Erio viridine B supra	G			
	Erio viridine B supra 561	G			
	Guinea fast green B	A			
	Benzyl green B	I			
505	Light green (yellowish)		933	1,325	Germany, 100 per cent.
	Light green yellowish SFXX	B			
	Acid green conc	M			
	Acid green extra conc	C			
506	Erioglaucine		16,004	37,455	Switzerland, 100 per cent.
	Erioglaucine supra 528	G			
	Erioglaucine EP	G			
	Erioglaucine EP 548	G			
	Erioglaucine AC 501	G			
507	Xylene blue VS		16,309		Do.
	Xylene blue VS	S			
508	Xylene blue AS		15,026		Do.
	Xylene blue AS	S			
	Xylene blue ASL	S			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
512	Magenta		7,110	$5,552	Holland, 81 per cent; Germany, 14 per cent; France, 5 per cent.
	Magenta	Q			
	Aniline red 3193	Q			
	Magenta small crystals	Q			
515	Methyl violet		272	145	Germany, 100 per cent.
	Methyl violet	C			
	Methyl violet NFB	B			
	Methyl violet V3D	K			
516	Crystal violet		1,450		Do.
	Crystal violet extra	B			
	Crystal violet powder	B			
	Crystal violet base	B			
517	Benzyl violet		2,138		Switzerland, 100 per cent.
	Benzyl violet 5BN	I			
518	Ethyl purple		1,389		Germany, 100 per cent.
	Ethyl violet	B			
522	Victoria blue 4R		44		Switzerland, 100 per cent.
	Victoria blue 4R	I			
523	Fast green		22,619	37,993	Germany, 99 per cent; Italy, 1 per cent.
	Fast green bluish	By			
	Fast green bluish 365	By			
	Fast green extra bluish	By			
	Fast green extra bluish 329	By			
	Fast green extra bluish 10543 (P1).	By			
	Fast green extra blue shade 10543.	By			
	Fast light green	By			
527	Acid violet 4BN		13,544	24,479	Switzerland, 96 per cent; Germany, 4 per cent.
	Acid violet 4BNS	S			
	Acid violet 4BNS	I			
	Acid violet BW	By			
	Acid violet BW 1175	By			
528	Fast acid violet 10B		14,837	30,747	Switzerland, 71 per cent; Germany, 29 per cent.
	Fast acid violet 10B	By			
	Fast acid violet 10B 10604	By			
	Fast acid violet 10B 10604 (VIII).	By			
	Fast acid violet 10B conc. 40-100.	By			
	Fast acid violet 10B conc. 40-100 10604B.	By			
	Kiton fast violet 10B conc	I			
530	Acid violet		2,692	5,841	Germany, 79 per cent; Switzerland, 21 per cent.
	Acid violet 6B	M			
	Acid violet 6B 668	G			
	Acid violet 6BNOO	B			
	Acid violet 7B	K			
531	Eriocyanine		16,808		Switzerland, 100 per cent.
	Eriocyanine A 665	G			
	Eriocyanine AC 503	G			
532	Alkali violet		50		Germany, 100 per cent.
	Alkali violet 6BOO	B			
534	Acid violet 7B		1,287	500	Do.
	Acid violet 7B	B			
	Acid violet 7B conc	B			
	Acid violet 7B conc. F	B			
535	Methyl alkali blue		10		Do.
	Methyl alkali blue	M			
536	Alkali blue		390	522	Do.
	Alkali blue B	C			
	Alkali blue 3B	C			
	Alkali blue 3RV	C			
537	Methyl blue for silk		6,755	22,388	Switzerland, 90 per cent; Germany, 10 per cent.
	Methyl Lyons blue 410	G			
	Methyl silk blue (new) 706	G			
	Methyl silk blue (new) 217	G			
	Silk blue IV	By			
539	Soluble blue		3,560	12,459	Germany, 100 per cent.
	Water blue 32129	A			
	Soluble blue IN	B			
	Soluble blue T	B			
	Silk blue BT 5BOO	GrE			
	Silk blue BT 5BOO	Q			
	Silk blue	Q			
	Pure blue	M			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (per age of quantity).
			Quantity.	Invoice value.	
			Pounds.		
541	Brilliant dianil blue 6G		273		Germany, 100 per cent.
	Brilliant sky blue 5G 1374	By			
543	Patent blue		42,708	$91,373	Germany, 86 per cent; land, 14 per cent.
	Neptune blue BGX	B			
	Neptune blue BGX conc	B			
	Patent blue X conc	M			
	Patent blue B	M			
	Patent blue B conc	M			
	Patent blue J4	M			
	Patent blue N conc	M			
	Patent blue V	M			
	Patent blue VE	M			
	Patent blue VF	M			
	Patent blue VSK	G			
	Patent marine blue LE	M			
	Patent marine blue LE	A			
	Tetra cyanole extra	C			
	Tetra cyanole V	C			
	Brilliant acid blue V	By			
	Brilliant acid blue V conc. 60-100 10754a.	By			
	Kiton pure blue V	I			
	Kiton pure blue V conc	I			
544	Cyanine B		3,651		Germany, 100 per cent.
	Cyanine B	M			
545	Patent blue A		16,170	29,483	Germany, 99 per cent; land, 1 per cent.
	Patent blue A	K			
	Patent blue A	M			
	Neptune blue BXX	B			
	Brilliant acid blue	By			
	Brilliant acid blue A	By			
	Brilliant acid blue A 1448	By			
	Brilliant acid blue FF	By			
	Brilliant acid blue FF C 573	By			
	Brilliant acid blue FF 1507	By			
	Brilliant acid blue FF 10573D (VIII).	By			
	Brilliant acid blue FF conc. 60-100 10573B.	By			
	Brilliant acid blue FF conc. 60-100 10573B (VIII).	By			
	Brilliant acid blue A conc. 55-100 10573C.	By			
	Brilliant acid blue A conc	Q			
	Brilliant acid blue FF (105731).	By			
546	Cyanol		14,271	30,337	Do.
	Cyanol extra	C			
	Cyanol FF	C			
	Cyanol FF extra	C			
	Cyanol extra H	C			
	Cyanol BSB	Q			
	Cyanol ABC	Q			
	Cyanol BSB	C			
	Cyanol MKH	C			
	Cyanol MKH	Q			
548	Acid violet 6BN		4,790	11,421	Switzerland, 98 per Germany, 2 per cent.
	Acid violet 6BN	M			
	Acid violet 6BN	I			
	Acid violet 6BN conc	I			
551	Erio chrome azurol BC		19,344	36,792	Switzerland, 100 per ce
	Erio chrome azurol BX	G			
	Erio chrome azurol BX 1041	G			
	Chrome fast pure blue B	I			
554	Chrome azurol		2,050		Do.
	Chrome azurol SXT 1046	G			
555	Aurine		300		Germany, 100 per cent.
	Aurine SIS	A			
558	Victoria blue R		771		Switzerland, 100 per ce
	Victoria blue R	I			
559	Victoria blue B		12,342	33,032	Switzerland, 99 per Germany, 1 per cent.
	Victoria blue B	B			
	Victoria blue B base	B			
	Victoria blue B base	I			
	Victoria blue B conc	I			
	Victoria blue B conc	S			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
559	Victoria blue B—Continued.		*Pounds.*		
	Victoria blue B highly conc..	B			
	Victoria pure blue B base....	B			
	Victoria pure blue BO.....	B			
560	Night blue.....		317		Germany, 100 per cent.
	Night blue.....	B			
	Night blue extra green shade.	By			
562	Fast acid blue.....		597		Do.
	Fast acid blue B 483.....	By			
	Wool blue SR extra 10564...	By			
563	New patent blue B.....		421		Do.
	New patent blue B 10570 (P1)	By			
564	Naphthalene green.....		23,926	$53,859	Switzerland, 88 per cent; France, 7 per cent; Germany, 5 per cent.
	Naphthalene green.....	P			
	Naphthalene green conc. extra.	M			
	Naphthalene green V.....	M			
	Erio green supra 657.....	G			
	Erio green B supra 657.....	G			
	Erio green BB supra 661.....	G			
	Kiton fast green V.....	I			
	Kiton fast green V conc.....	I			
565	Acid blue B.....		1,731	3,643	Germany, 100 per cent.
	Wool blue G extra.....	A			
	Wool blue 5B.....	A			
	Wool blue R extra.....	By			
566	Wool green S.....		51,822	115,279	Switzerland, 70 per cent; Germany, 30 per cent.
	Wool green S.....	B			
	Wool green S conc.....	S			
	Wool green S highly conc....	B			
	Wool green BS 10550 (P1)....	By			
	Cyanole green KBC.....	C			
	Cyanole fast green G.....	C			
	Wool green S conc. 250 per cent.	I			
	Wool green SC 655.....	G			
	Wool green SC 655, 95 per cent.	G			
569	Acridine red.....	Q	4		France, 100 per cent.
570	Rhodamine S.....		220		Switzerland, 100 per cent.
	Rhodamine S.....	I			
571	Rhodamine 6G.....		10,069	76,933	Germany, 63 per cent; Switzerland, 37 per cent.
	Rhodamine 6G.....	B			
	Rhodamine 6G.....	K			
	Rhodamine 6G.....	M			
	Rhodamine 6G 12214.....	B			
	Rhodamine 6G 18607.....	B			
	Rhodamine 6G extra.....	B			
	Rhodamine 6G extra.....	By			
	Rhodamine 6G extra.....	M			
	Rhodamine 6G extra.....	S			
	Rhodamine 6G extra pure...	B			
	Rhodamine 6GD extra.....	M			
	Rhodamine 6GDN.....	B			
	Rhodamine 6GDN extra.....	B			
	Rhodamine 6GW conc.....	I			
	Rhodamine 6G extra.....	I			
572	Rhodamine G.....		105		Germany, 100 per cent.
	Rhodamine G.....	M			
	Rhodamine G extra.....	M			
573	Rhodamine B.....		10,890	37,146	Switzerland, 59 per cent; Germany, 41 per cent.
	Rhodamine B base.....	I			
	Rhodamine B extra.....	I			
	Rhodamine B extra.....	S			
	Rhodamine B extra.....	B			
	Rhodamine B extra.....	M			
	Rhodamine B extra base....	B			
	Rhodamine B extra conc....	Q			
	Carthamine B.....	B			
579	Xylene red.....		1,001		Switzerland, 100 per cent.
	Xylene red B.....	S			
580	Fast acid violet B.....	M	428		Germany, 100 per cent.
	Violamine B.....	M			
581	Fast acid magenta G.....	M	50		Do.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (per cent age of quantity).
			Quantity.	Invoice value.	
			Pounds.		
587	Eosine		16,192	$26,147	Germany, 100 per cen
	Eosine extra AG	M			
	Bromofluoresceine acid crystals.	M			
	Eosine extra GF (free from salt).	M			
	Eosine GGB	C			
	Eosine extra A 5G	M			
	Bromofluoresceine A 3G	M			
	Bromofluoresceine BL bluish	M			
	Bromofluoresceine crystals	M			
590	Eosine BNL		161		Do.
	Acid eosine L new	B			
591	Erythrosine G		110		Switzerland, 100 per c
	Erythrosine G	Q			
592	Erythrosine bluish 7699	M	514		Germany, 100 per cent
595	Rose bengale		285	1,644	Switzerland, 96 per
	Rose bengale NTO	B			Germany, 4 per cent
	Rose bengale double conc	DH			
	Rose bengale double conc. powder.	DH			
599	Galleine		3,494	432	Germany, 100 per cent
	Galleine SW powder	B			
	Galleine powder	M			
	Galleine WN 20 per cent paste.	B			
601	Coerulein S		2,942	275	Do.
	Coerulein 10 per cent paste	B			
	Coerulein S powder	B			
	Coerulein SS powder	B			
	Coerulein SW powder	B			
	Coerulein 100 per cent powder.	B			
603	Acridine orange		1,613	5,745	Switzerland, 72 per
	Euchrysine 3RX	B			Germany, 28 per cen
	Euchrysine 3RX	I			
	Acridine orange	I			
	Rhoduline orange NO 50-100	By			
606	Phosphine		21,325	89,381	Switzerland, 88 per
	Phosphine extra	M			Germany, 9 per ce
	Phosphine 3R	A			3 per cent.
	Para phosphine G	C			
	Patent phosphine G conc. paste.	I			
	Patent phosphine R conc. paste.	I			
	Patent phosphine M conc	I			
	Saba phosphine 2G	S			
	Saba phosphine GG	S			
	Saba phosphine M conc	S			
	Coriphosphine OX extra	By			
	Phosphine R	BD			
	Patent phosphine M 300 per cent.	I			
	Patent phosphine G 300 per cent.	I			
	Patent phosphine GG 300 per cent.	I			
	Patent phosphine R 300 per cent.	I			
	Brilliant phosphine 5G 300 per cent.	I			
	Brilliant phosphine 5G conc	I			
	Phosphine G triple	I			
	Phosphine 7G 807 leather	G			
	Phosphine PGG 808 leather	G			
	Patent phosphine G conc. 300 per cent balance.	I			
	Patent phosphine GG conc. 300 per cent.	I			
	Patent phosphine 5G	I			
607	Rheonine		130		Germany, 100 per cen
	Rheonine GD	B			
	Rheonine AL conc	B			
608	Euchrysine		872	674	Do.
	Euchrysine RRX	B			
	Euchrysine GRNTN	B			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
608	Euchrysine—Continued.		*Pounds.*		
	Euchrysine RRLX	B			
	Euchrysine RT	B			
	Euchrysine 2RX	B			
609	Homophosphine		918	$2,287	Germany, 67 per cent; England, 33 per cent.
	Diamond phosphine GG	C			
	Homophosphine OO	L			
	Coriofiavine GOOO	GrE			
613	Quinoline yellow		23,000	43,893	Switzerland, 63 per cent: Germany, 37 per cent.
	Quinoline yellow	I			
	Quinoline yellow	S			
	Quinoline yellow	A			
	Quinoline yellow	M			
	Quinoline yellow 10534 (Pl)	By			
	Quinoline yellow conc. 50/100	By			
	Quinoline yellow extra	B			
	Quinoline yellow KT extra	By			
	Quinoline yellow KT extra conc.	By			
	Quinoline yellow N extra 10536 (Pl).	By			
	Quinoline yellow OK	M			
	Quinoline O conc	M			
	Quinoline yellow	By			
	Quinoline yellow O	M			
	Quinoline yellow extra (easily soluble).	B			
	Quinoline yellow 754	G			
	Quinoline yellow	S			
616	Primuline		771		Switzerland, 100 per cent.
	Polychromine AC 127	G			
617	Columbia yellow		5,243	7,436	England, 58 per cent; Switzerland, 41.7 per cent; Germany, 0.3 per cent.
	Chloramine yellow G	S			
	Diamine fast yellow B	C			
	Diamine fast yellow FF	C			
	Oxyphenine R	ClCo			
	Oxyphenine GG 300 per cent conc.	ClCo			
618	Thioflavine T		7,297	13,385	Germany, 74 per cent; Italy, 22 per cent; Switzerland, 4 per cent.
	Thioflavine T	S			
	Thioflavine T	K			
	Thioflavine T	C			
	Thioflavine TCN	C			
	Rhoduline yellow 6G	By			
	Rhoduline yellow 6G 1280	By			
	Methylene yellow H	M			
620	Capri blue GON		549		Germany, 100 per cent.
	Capri blue GON conc	L			
	Capri blue GON	L			
622	Delphine blue B		13,842	21,116	Switzerland, 100 per cent.
	Brilliant delphine blue B	S			
	Brilliant delphine blue BS	S			
	Delphine blue	S			
626	Gallocyanine		12,343		Switzerland, 97 per cent; Germany, 3 per cent.
	Gallocyanine paste	S			
	Gallocyanine F powder	B			
627	Anthracyanine		684		Switzerland, 100 per cent.
	Anthracyanine S powder	DH			
629	Modern blue	DH	10		Do.
635	Modern violet		2,002		Do.
	Ultra violet MO	S			
636	Prune		1,928		Do.
	Prune pure	S			
637	Gallamine blue extra paste		15,179		Do.
	Gallamine blue extra paste 900.	G			
	Gallamine blue extra paste	G			
641	Celestine blue B		5		Do.
	Coreine RR powder No. 65	Q			
642	Phenocyanine VS paste	DH	1,001		Do.
649	Cotton blue		3,543		Do.
	Meldola's blue 3R conc	S			
	New blue RS conc	I			
651	New methylene blue GG	C	266		Germany, 100 per cent.
653	Nile blue		749		Do.
	Nile blue BX	B			
654	Nile blue 2BX	B	764		Do.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
658	Fast black		408		Germany, 100 per cent.
	Gallophenine P	By			
	Gallophenine P 100 per cent	By			
659	Methylene blue		1,600	$2,586	Switzerland, 39 per cent; England, 38 per cent; Germany, 23 per cent.
	Methylene blue	Q			
	Methylene blue medic. fine powder.	I			
	Methylene blue BG extra conc.	M			
	Methylene blue BBS zinc free.	S			
660	Methylene green		3,318	6,490	Switzerland, 99.7 per cent; Germany, 0.3 per cent.
	Methylene green BX	B			
	Methylene green W 748	G			
	Methylene green P extra	I			
661	Thionine blue		421		Switzerland, 52 per cent; Germany, 48 per cent.
	Thionine blue GO	I			
	Thionine blue GO	M			
663	New methylene blue		4,329	9,072	Germany, 90 per cent; England, 7 per cent; Italy, 3 per cent.
	New methylene blue N	C			
	New Methylene blue N extra conc.	M			
	New methylene blue N conc. 145 per cent.	C			
667	Indochromine	S	8,725	23,172	Switzerland, 98 per cent; Germany, 2 per cent.
	Indochromine RR conc. double.	S			
	Indochromine T	S			
	Indochromine T conc	S			
	Brilliant alizarin blue R powder 571.	By			
	Indochromine RR	S			
672	Azo carmine		8,684	19,428	Germany, 100 per cent.
	Azo carmine GX	B			
	Azo carmine GX 30833	B			
	Azo carmine GX powder	B			
673	Azo carmine B		1,774	1,848	Germany, 89 per cent; England, 11 per cent.
	Azo acid carmine B	M			
	Azo carmine BB	B			
	Azo carmine BX	B			
	Azo carmine BXH	B			
	Rosinduline 2B bluish	K			
676	Neutral blue R extra		110		Switzerland, 100 per cent.
	Neutral blue R	I			
679	Safranine		741		Germany, 60 per cent; Switzerland, 40 per cent.
	Safranine FF extra conc	By			
681	New fast gray		2,296		France, 100 per cent.
	Direct gray J	P			
	Direct gray	P			
687	Rosolane CTR		2,393		Germany, 100 per cent.
	Rosolane C	M			
	Methylene heliotrope extra conc.	M			
688	Rosolane		131		France, 92 per cent; Germany, 8 per cent.
	Rosolane	P			
	Rosolane extra strong	M			
689	Indazine M	C	258		Germany, 100 per cent.
690	Metaphenylene blue R		1,700		Do.
	Diphene blue RK	A			
693	Milling blue BC		4,056		Switzerland, 100 per cent.
	Cloth fast blue B	I			
	Cloth fast blue B extra	I			
700	Nigrosine (soluble in water)		100		Germany, 100 per cent.
	Silver gray P	A			
705	Indamine 6R		9,946	14,344	Do.
	Indocyanine B	A			
	Acid cyanine BF	A			
	Acid cyanine BF	By			
706	Katigene black brown		12		Do.
	Katigene black brown GN extra conc. 11506 (XI).	By			
709	Pyrogene green 2G		1,947		Switzerland, 100 per cent.
	Pyrogene green 3G 250 per cent.	I			
	Pyrogene green 3G	I			
710	Immedial yellow D		6		Germany, 100 per cent.
	Immedial yellow D	C			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
711	Immedial orange C		320		Germany, 100 per cent.
	Immedial orange C	C			
726	Pyrogene blue		11,718		Switzerland, 100 per cent.
	Pyrogene direct blue RL conc.	I			
	Pyrogene direct blue RL	I			
734	Pyrogene yellow		2,912	$6,652	Do.
	Pyrogene yellow M 95 conc.	I			
	Pyrogene yellow O conc	I			
	Pyrogene yellow O	I			
	Pyrogene yellow O 600	I			
	Pyrogene yellow M 450	I			
735	Pyrogene indigo		441		Do.
	Pyrogene indigo	I			
746	Katigene green		6,543	7,897	Switzerland, 92 per cent; Germany, 8 per cent.
	Katigene green 2G conc. 50-100.	By			
	Thional brilliant green GG	S			
	Thional brilliant green 2G	S			
	Pyrogene olive 3G	I			
	Thional dark green GN	S			
748	Hydron blue (single strength)		146,072	117,454	Germany, 93 per cent; Italy, 6 per cent; England, 1 per cent.
	Hydron blue G paste 20-100	C			
	Hydron blue G paste 30-100	C			
	Hydron blue G paste 40-100	C			
	Hydron blue G powder	C			
	Hydron blue R paste 20-100	C			
	Hydron blue R paste 30-100	C			
	Hydron blue R powder	C			
	Hydron violet B paste	C			
	Hydron blue B paste	C			
	Hydron blue RF powder	C			
	Hydron blue B powder	C			
	Hydron olive B powder	C			
	Hydron olive G powder	C			
759	Anthraflavone G paste		10,594	14,389	Germany, 95 per cent; Italy, 5 per cent.
	Anthraflavone G	B			
	Anthraflavone G paste	B			
	Anthraflavone GG paste	B			
	Anthraflavone GC paste fine	B			
	Anthraflavone GC paste	By			
760	Indanthrene golden orange G (single strength).		33,423	44,829	Germany, 95.7 per cent; England, 4 per cent; Italy, 0.3 per cent.
	Indanthrene golden orange G paste.	B			
	Indanthrene golden orange G paste sand free.	B			
	Indanthrene golden orange G double paste.	B			
	Indanthrene golden orange G double paste.	A			
	Indanthrene golden orange G double paste sand free.	B			
	Indanthrene golden orange G powder.	B			
761	Indanthrene golden orange R		56,390	101,739	Germany, 95.3 per cent; England, 2 per cent; Holland, 2 per cent; Italy, 0.7 per cent.
	Indanthrene golden orange R paste.	B			
	Indanthrene golden orange R paste sand free.	B			
	Indanthrene golden orange RRT paste.	A			
	Indanthrene golden orange RRT paste.	B			
	Indanthrene golden orange RRT paste fine.	B			
	Indanthrene golden orange RRT paste sand free.	B			
	Indanthrene golden orange RRT powder.	B			
762	Indanthrene scarlet GS powder		472		Germany, 100 per cent.
	Indanthrene scarlet G paste	B			
	Indanthrene scarlet GS powder.	B			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
763	Indanthrene dark blue BO paste.		3,484	$1,822	Germany, 57 per cent; H land, 43 per cent.
	Indanthrene dark blue BO paste.	B			
	Indanthrene dark blue BO paste sand free.	B			
	Indanthrene dark blue BO..	B			
764	Indanthrene violet RT paste....	B	516		Germany, 100 per cent.
765	Indanthrene green B paste.....		6,932	3,978	Do.
	Indanthrene green B paste..	B			
	Indanthrene green B double paste.	B			
	Indanthrene green B double paste sand free.	B			
766	Indanthrene violet R extra paste.		5,241		Italy, 85 per cent; Germa 15 per cent.
	Indanthrene violet R extra paste.	B			
	Indanthrene violet R extra powder.	B			
767	Indanthrene violet RR.....		52,083	62,237	Germany, 88 per cent; It 10 per cent; England, 2 cent.
	Indanthrene violet 2R extra paste.	B			
	Indanthrene violet 2R extra paste fine.	B			
	Indanthrene violet RR extra.	B			
	Indanthrene violet RR extra paste.	B			
	Indanthrene violet RR extra paste fine.	B			
	Indanthrene violet RR extra paste sand free.	B			
	Indanthrene violet RR extra P paste.	B			
	Indanthrene violet RR extra powder.	B			
	Indanthrene violet RR extra p. powder.	B			
	Indanthrene violet RRX powder.	B			
768	Indanthrene violet B.....		14,957	3,045	Germany, 89 per cent; H land, 11 per cent.
	Indanthrene violet B extra paste.	B			
	Indanthrene black BB paste redissolved.	B			
	Indanthrene black BB double paste.	Q			
	Indanthrene black BB double paste.	B			
	Indanthrene black BB double paste sand free.	B			
	Indanthrene black BB powder.	B			
771	Resoflavine paste.....	B	1,572		Germany, 100 per cent.
774	Alizarin black.....		26,524	10,706	Do.
	Alizarin black B.....	K			
	Alizarin black B powder.....	By			
	Alizarin black S paste for printing.	M			
	Alizarin black S paste.....	B			
	Alizarin black SRW paste...	B			
	Alizarin black WR 16-100 paste.	B			
	Alizarin black WR 40-100 paste.	B			
	Alizarin black WX extra paste.	B			
	Alizarin black WX extra N paste.	B			
	Alizarin black WX extra single paste.	B			
	Alizarin blue black GT powder.	B			
778	Alizarin synthetic.....		136,283	49,707	
779	Alizarin orange.....		5,854	1,500	Holland, 36 per cent; G many, 34 per cent; H land, 30 per cent.
	Alizarin orange.....	B			
	Alizarin orange SW powder..	B			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
779	Alizarin orange—Continued.		*Pounds.*		
	Alizarin orange GG	M			
	Alizarin orange 80 powder	M			
	Alizarin orange W 15	M			
	Alizarin orange 20-100	Q			
	Alizarin orange SW powder 884 (R).	By			
780	Alizarin red		15,565	$16,653	Germany, 96 per cent; England, 4 per cent.
	Alizarin red S powder	B			
	Alizarin red SWB powder	B			
	Alizarin red SWBB powder	B			
	Alizarin red WB paste	B			
	Alizarin red WX extra S paste.	B			
	Alizarin red W powder	K			
	Alizarin red W powder	By			
	Alizarin red W powder 773	By			
	Alizarin red W powder 11376	By			
	Alizarin red W powder 11376 (Pl.).	By			
	Alizarinred W powder 10-400	By			
	Alizarin red IWS powder	M			
	Alizarin red IWS conc	M			
782	Alizarin brown		20,700	1,272	Germany, 100 per cent.
	Alizarin brown 1687	M			
	Alizarin brown 40	M			
	Alizarin brown 80 per cent	M			
	Alizarin brown F	M			
	Alizarin brown H	M			
	Alizarin brown N	M			
	Anthracene brown 20-100 paste.	B			
	Anthracene brown 40-100 paste.	B			
	Anthracene brown 100 per cent powder.	B			
	Anthracene brown SW powder.	B			
	Anthracene brown SWR powder.	B			
	Anthracene brown W 20-100.	M			
	Anthracene brown WR	M			
	Anthracene brown WR 20-100 paste.	B			
	Anthracene brown WB 20-100 paste.	B			
	Anthracene brown WG 20-100 paste.	B			
784	Alizarin SX, GD		12,205	2,386	Do.
	Alizarin SX	B			
	Alizarin SX 20-100	B			
	Alizarin SX 20-100 paste	B			
	Alizarin SX powder	B			
	Alizarin GD II	B			
	Alizarin GD 20 per cent paste.	B			
785	Alizarin RG, GI		18,266	4,673	Germany, 77 per cent; England, 23 per cent.
	Alizarin RG powder	B			
	Alizarin GI powder	G			
	Alizarin YCA 20-100	Q			
	Alizarin GG	By			
	Alizarin red SDG 20-100	M			
	Alizarin red SDG paste	M			
787	Alizarin Bordeaux B, BD		1,803	1,436	England, 66 per cent; Germany, 34 per cent.
	Alizarin Bordeaux B paste	B			
	Alizarin Bordeaux B paste	By			
	Alizarin Bordeaux 20-100	Q			
788	Alizarin cyanine R		2,750	1,380	England, 73 per cent; Germany, 27 per cent.
	Alizarin cyanine R powder	By			
	Alizarin cyanine WRB paste 11308 (Pl.).	By			
	Alizarin cyanine 10-100	By			
789	Anthracene blue WR		107,769	93,857	Germany, 100 per cent.
	Anthracene blue WR paste	B			
	Anthracene blue WR double paste.	B			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
789	Anthracene blue WR—Con.		*Pounds.*		
	Anthracene blue WR double paste.	Q			
	Anthracene blue WR extra paste.	B			
790	Acid alizarin blue BB, GR		14,375	$5,891	Germany, 91 per c
	Acid alizarin blue GR	M			France, 9 per cent.
	Anthracene blue SWGG powder.	B			
	Anthracene blue SWGG extra powder.	B			
	Anthracene blue SWR powder.	B			
	Anthracene dark blue W paste.	B			
	Acid alizarin blue BB	M			
791	Indanthrene olive G powder	B	5		Germany, 100 per cent.
792	Cibanone orange R		5,887	14,188	Switzerland, 100 per cent
	Cibanone orange R paste	I			
	Cibanone orange R powder	I			
	Cibanone green B paste	I			
	Cibanone green G paste	I			
	Cibanone olive B paste	I			
793	Cibanone blue 3G		227		Do.
	Cibanone blue 3G paste 10-100	I			
	Cibanone blue 3G paste	I			
794	Cibanone black		1,102		Do.
	Cibanone black B paste	I			
795	Cibanone yellow R		1,770	7,537	Do.
	Cibanone yellow R paste	I			
	Cibanone yellow R powder	I			
796	Acid alizarin green BG		1,322		Germany, 100 per cent.
	Acid alizarin green B	M			
	Acid alizarin green 3G	M			
797	Alizarin garnet		1,523		Do.
	Alizarin claret R paste	M			
798	Alizarin maroon W		2,751		Do.
	Alizarin maroon 20-100 paste	B			
799	Alizarin cyanine G		3,336	3,224	Germany, 55 per cent; H
	Alizarin cyanine G extra powder 11319 (P1).	By			land, 38 per cent; Fra 7 per cent.
	Alizarin cyanine GG powder	By			
	Alizarin cyanine RR powder 11307 (P1).	By			
	Alizarin cyanine GG powder 100 per cent.	By			
800	Anthracene blue		4,057		Germany, 100 per cent.
	Anthracene blue WB paste	B			
	Anthracene blue WG paste	B			
801	Anthracene blue WGG		4,409		Do.
	Anthracene blue WGG paste	B			
803	Alizarin blue WX, A		12,482	9,845	Do.
	Alizarin blue A 20	M			
	Alizarin blue A 100 per cent	M			
	Alizarin blue WX 20 per cent	B			
	Alizarin blue WX 20 per cent. paste.	B			
	Alizarin blue JR	K			
	Alizarin blue JR powder 1130	By			
804	Alizarin blue S		21,521	11,801	Germany, 98 per cent; I
	Alizarin blue S	M			6 per cent; Switzerlan
	Alizarin blue S 45—100	M			per cent.
	Alizarin blue S powder	B			
	Alizarin blue S powder 11388 (P1).	By			
	Alizarin blue SAP powder	By			
	Alizarin blue SAWSA	By			
	Alizarin blue SB 45	M			
	Alizarin blue SB 45 conc	M			
	Alizarin blue SW powder	By			
	Alizarin dark blue S 23	M			
	Alizarin blue SR	M			
	Alizarin blue SRW paste	B			
	Alizarin blue SRW powder	B			
	Alizarin blue SW	M			
	Alizarin blue SW powder	B			
	Alizarin blue S powder	By			
	Alizarin blue SAP	S			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
808	Alizarin green		2,000		England, 100 per cent.
	Alizarin green S paste 15-100	Q			
808	Alizarin green S paste		4,465	$4,645	Germany, 100 per cent.
	Alizarin green S paste	B			
	Alizarin green CG	K			
	Alizarin green CG extra	K			
809	Alizarin indigo blue S		619		Do.
	Alizarin indigo blue S paste	B			
810	Helindone yellow 3GN (single strength).		352		Italy, 100 per cent.
	Helindone yellow 3GN powder.	M			
811	Algol yellow 3G		1,048		Germany, 100 per cent.
	Algol yellow 3G paste 1487	By			
812	Indanthrene orange RT paste	B	212		Do.
816	Algol red 5G (single strength)		578		Do.
	Algol red 5G paste	By			
	Algol red 5G powder 1539	By			
817	Algol yellow R (single strength)		2,400		Do.
	Algol yellow R powder	By			
818	Algol pink R (single strength)		5,153	3,372	Germany, 87 per cent; Italy, 13 per cent.
	Algol pink R paste	By			
	Algol pink R paste, 10 per cent, 11569 (111).	By			
	Algol pink R paste 1:8 11569 (P1).	By			
	Algol pink R powder	By			
	Algol pink R powder (166S)	By			
	Algol pink R powder (11570)	By			
819	Algol red R. FF (single strength)		14,489	15,899	Germany, 88 per cent; England, 10 per cent; Holland, 2 per cent.
	Algol brilliant red 2B paste 8-100 11747 (111).	By			
	Algol brilliant red 2B paste	By			
	Algol brilliant red 2B powder.	By			
	Algol brilliant red 2B powder 11573.	By			
	Algol red F extra powder 1870.	By			
	Algol red F extra powder 11563.	By			
	Algol red FF extra paste	By			
	Algol red FF extra paste 1857.	By			
	Algol red FF extra paste 8 per cent 11562 (111).	By			
	Algol red FF extra powder 11563.	By			
	Algol red R extra paste	By			
	Algol red R extra paste 1:8 11560 (P1).	By			
	Algol red R extra paste 8-100 11560 (111).	By			
820	Algol brilliant violet R		3,782	4,463	Germany, 100 per cent.
	Algol brilliant violet R paste 1773.	By			
	Algol brilliant violet R paste 1894.	By			
	Algol brilliant violet R paste 10-100 11749 (111).	By			
	Algol brilliant violet R powder.	By			
	Algol brilliant violet R powder 11749a (111).	By			
	Algol brilliant violet R paste.	By			
821	Algol brilliant violet 2B (single strength).		1,951	1,560	Germany, 74 per cent; Italy, 26 per cent.
	Algol brilliant violet 2B	By			
	Algol brilliant violet 2B paste 10-100 11748 (111).	By			
	Algol brilliant violet 2B powder.	By			
	Algol brilliant violet 2B powder 11654.	By			
	Algol blue 3R powder	By			
	Algol blue 3RP powder	By			
	Algol brilliant violet 2B paste.	By			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
822	Algol brilliant orange FR (single strength).	.....	1,228	$2,840	Germany, 82 per cent; Italy, 18 per cent.
	Algol brilliant orange FR paste.	By	.....	.....	
	Algol brilliant orange FR powder 1822.	By	.....	.....	
	Algol brilliant orange FR powder 11576.	By	.....	.....	
	Algol brilliant orange FR powder 11576 (111).	By	.....	.....	
	Algol brilliant orange FR powder 11576 (111).	By	.....	.....	
824	Algol orange R (single strength).	.....	2,685	301	Germany, 100 per cent.
	Algol orange R paste.	K	.....	.....	
	Algol orange R paste 1:8 11574 (Pl).	By	.....	.....	
	Algol orange R powder 1501.	By	.....	.....	
	Algol orange R powder 11575.	By	.....	.....	
	Algol orange R powder 11575 (Pl).	By	.....	.....	
825	Algol red B	.....	6,626	7,706	Germany, 98 per cent; Holland, 2 per cent.
	Algol red B paste.	Q	.....	.....	
	Algol red B paste.	By	.....	.....	
	Algol red B paste 11556 (Pl).	By	.....	.....	
827	Indanthrene claret B extra (single strength).	.....	9,020	8,532	Germany, 84 per cent; Belgium, 12 per cent; England, 4 per cent.
	Indanthrene claret B extra paste.	B	.....	.....	
	Indanthrene claret B extra paste, sand free.	B	.....	.....	
	Indanthrene claret B double paste.	B	.....	.....	
	Indanthrene claret B extra powder.	B	.....	.....	
	Indanthrene Bordeaux B extra paste.	B	.....	.....	
	Indanthrene Bordeaux B extra double paste.	B	.....	.....	
	Indanthrene Bordeaux B double paste, sand free.	B	.....	.....	
830	Indanthrene red R (single strength).	.....	3,760	.....	Germany, 100 per cent.
	Indanthrene red R paste.	B	.....	.....	
	Indanthrene red R powder.	B	.....	.....	
831	Indanthrene red BN (single strength).	.....	21,331	27,249	Germany, 97 per cent; England, 3 per cent.
	Indanthrene red BN extra paste.	B	.....	.....	
	Indanthrene red BN extra paste, fine.	B	.....	.....	
	Indanthrene red BN extra paste, sand free.	B	.....	.....	
	Indanthrene red BN extra powder.	B	.....	.....	
	Indanthrene red BN paste.	B	.....	.....	
832	Indanthrene violet RN	.....	1,680	.....	Germany, 100 per cent.
	Indanthrene violet RN extra, sand free.	B	.....	.....	
833	Algol olive R (single strength).	.....	337	.....	Germany, 74 per cent; Italy, 26 per cent.
	Algol olive R paste.	By	.....	.....	
	Algol olive R powder.	By	.....	.....	
834	Algol gray (single strength).	.....	120	.....	Germany, 100 per cent.
	Algol gray B powder.	By	.....	.....	
836	Helindone brown 3GN.	.....	330	.....	Do.
	Helindone brown 3GN paste.	M	.....	.....	
838	Indanthrene blue RS (single strength).	.....	28,908	7,224	Germany, 91 per cent; Italy, 9 per cent.
	Indanthrene blue RS paste.	B	.....	.....	
	Indanthrene blue RS paste (for paper).	B	.....	.....	
	Indanthrene blue RS paste (for paper), sand free.	B	.....	.....	
	Indanthrene blue RSP paste.	B	.....	.....	
	Indanthrene blue RS double paste.	B	.....	.....	
	Indanthrene RS double paste, sand free.	B	.....	.....	

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
838	Indanthrene blue RS (single strength)—Continued.		*Pounds.*		
	Indanthrene blue RS (for paper) powder, triple.	B			
	Indanthrene blue RSP triple powder.	B			
839	Algol blue K (single strength)		66		Italy, 100 per cent.
	Algol blue K powder	By			
840	Indanthrene blue 3G (single strength).		19,715	$12,746	Germany, 68 per cent; Italy, 32 per cent.
	Indanthrene blue 3G paste	B			
	Indanthrene blue 3G paste sand free.	B			
	Indanthrene blue 3G double paste, sand free.	B			
	Indanthrene blue 3G powder.	B			
	Indanthrene blue 3GP powder.	B			
841	Indanthrene blue GGS (single strength).		2,310	2,535	Germany, 100 per cent.
	Indanthrene blue GGSP paste.	B			
	Indanthrene blue GGSP double paste (thin).	B			
	Indanthrene blue GGSP double paste (thick).	B			
	Indanthrene blue GGSZ double paste.	B			
	Indanthrene blue GGSNP quintriple powder.	B			
842	Indanthrene blue GCD (single strength).		201,835	75,061	Germany, 90 per cent; Italy, 10 per cent.
	Indanthrene blue GCD single paste.	B			
	Indanthrene blue GCD paste, sand free.	B			
	Indanthrene blue GCD double paste.	B			
	Indanthrene blue GCD double paste.	Q			
	Indanthrene blue GCD double paste, fine.	B			
	Indanthrene blue GCD double paste, sand free.	B			
	Indanthrene blue GCD powder.	B			
	Indanthrene blue GCD double paste.	B			
	Indanthrene blue GCD paste.	B			
	Duranthrene blue CC	BD			
843	Indanthrene blue CC paste	B	240		Germany, 100 per cent.
844	Algol blue 3G (single strength)		4,623	3,435	Germany, 90 per cent; Italy, 10 per cent.
	Algol blue 3G paste	By			
	Algol blue 3G paste 1412	By			
	Algol blue 3G paste 11588	By			
	Algol blue 3G paste 1:8 11588 (III).	By			
	Algol blue 3G paste 9-100 11588.	By			
	Algol blue 3G powder 1495	By			
	Algol blue 3G powder 11589	By			
847	Algol green B (single strength)		1,080		Germany, 79 per cent; Italy, 21 per cent.
	Algol green B powder	By			
848	Indanthrene gray BP (single strength).		2,680	253	Germany, 80 per cent; Italy, 20 per cent.
	Indanthrene gray B paste	B			
	Indanthrene gray B paste, sand free.	B			
	Indanthrene gray double paste, sand free.	B			
849	Indanthrene yellow (single strength).		49,609	34,532	Germany, 85 per cent; Italy, 11 per cent; England, 4 per cent.
	Indanthrene yellow G paste.	B			
	Indanthrene yellow G double paste, fine.	B			
	Indanthrene yellow G powder.	B			
	Indanthrene yellow GP powder.	B			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (p age of quantity)
			Quantity.	Invoice value.	
			Pounds.		
849	Indanthrene yellow (single strength)—Continued.				
	Indanthrene yellow GN extra paste, sand free.	B			
	Indanthrene yellow R paste.	B			
	Indanthrene yellow R paste, sand free.	B			
	Indanthrene yellow R powder.	B			
	Indanthrene yellow GT double paste.	B			
	Indanthrene yellow G double paste.	B			
	Indanthrene yellow R paste, 100 per cent.	B			
	Duranthrene yellow GX	BD			
850	Indanthrene blue WB		116		Germany, 100 per cent
	Indanthrene blue WBO powder.	B			
	Indanthrene blue WB powder.	B			
851	Alizarin direct blue B		225		Do.
	Alizarin direct blue E 3B	M			
	Alizarin cyanole B	C			
852	Alizarin irisol DR		2,456	$5,657	Do.
	Alizarin irisol R powder	By			
	Alizarin irisol R conc. 75-100 powder 11362 B.	By			
	Alizarin direct violet	M			
853	Anthraquinone violet powder	B	1,165		Do.
854	Alizarin viridine DG, FF		9,499	7,675	Do.
	Alizarin viridine FF paste	By			
	Alizarin viridine FF paste 11299 (V).	By			
	Alizarin viridine FF paste 11299 (P1).	By			
	Alizarin viridine FF paste 1:4½ 11299A.	By			
	Alizarin viridine FF paste 11712.	By			
	Alizarin viridine FF paste 11300 (P1).	By			
	Alizarin viridine FF powder.	By			
855	Alizarin pure blue		12,796	36,575	Do.
	Alizarin sky blue	K			
	Alizarin sky blue	By			
	Alizarin sky blue powder	By			
	Alizarin sky blue B conc.	By			
	Alizarin sky blue B powder.	By			
	Alizarin sky blue B powder 1038.	By			
	Alizarin sky blue B powder 11351.	By			
	Alizarin sky blue B powder 11351 (P1).	By			
	Alizarin sky blue B powder 11351 (V).	By			
	Alizarin sky blue B powder 113551.	By			
	Alizarin sky blue B conc. 70-100 powder (11351a).	By			
	Alizarin sky blue 1038	By			
856	Alizarin astrol		24,657	52,232	Germany, 94.9 per cent land, 2 per cent; En 1 per cent; Italy, 0. cent; Belgium, 0.4 pe Denmark, 1 per cent
	Alizarin astrol B powder	B			
	Alizarin astrol B powder	By			
	Alizarin astrol B powder 11350.	By			
	Alizarin astrol B powder 40-100.	By			
	Alizarin astrol B powder 1225.	By			
	Alizarin astrol B powder 11350 (P1).	By			
	Alizarin astrol B powder conc. 40-100 11358.	By			
	Alizarin astrol B powder conc. 40-100 11350B (V).	By			
	Alizarin astrol B extra	By			
	Alizarin rubinol 3G	By			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports. Quantity.	Imports. Invoice value.	Countries of origin (percentage of quantity).
856	Alizarin astrol—Continued.		*Pounds.*		
	Alizarin rubinol 3G powder.	By			
	Alizarin rubinol 3G powder 11372.	By			
	Alizarin rubinol 3G powder 11372 (P1).	By			
	Alizarin rubinol 3G conc. powder 40-100 (11372A).	By			
	Alizarin rubinol GW powder.	B			
	Alizarin rubinol GW powder.	By			
	Alizarin rubinol GW powder 1582.	By			
	Alizarin rubinol GW powder 11371.	By			
	Alizarin rubinol GW powder 11371 (P1).	By			
	Alizarin rubinol GW powder 11371 (V).	By			
	Alizarin rubinol R	K			
	Alizarin rubinol R	By			
	Alizarin rubinol R powder	By			
	Alizarin rubinol R powder 1395.	By			
	Alizarin rubinol R powder 11370 (P1).	By			
	Alizarin rubinol R powder conc. 40-100 11375A.	By			
858	Alizarin saphirol B		28,606	$71,560	Germany, 76 per cent; Italy, 13 per cent; Holland, 8 per cent; Switzerland, 3 per cent.
	Alizarin saphirol	Q			
	Alizarin saphirol B	By			
	Alizarin saphirol B conc. 60-100.	By			
	Alizarin saphirol B powder	B			
	Alizarin saphirol B powder	By			
	Alizarin saphirol BL powder 11357 (P1).	By			
	Alizarin saphirol C 28365 powder 11336 (P1).	By			
	Alizarin saphirol SE conc. 75-100.	By			
	Alizarin saphirol SE powder.	B			
	Alizarin saphirol SE powder 847.	By			
	Alizarin saphirol SE powder 11341.	By			
	Alizarin saphirol SE powder 11341 (P1).	By			
	Alizarin saphirol SE powder 11341 (V).	By			
	Alizarin saphirol WSA powder 1780.	By			
	Alizarin saphirol WSA powder 11345 (P1).	By			
	Helio fast blue BL	By			
	Helio fast blue BL conc.	By			
	Helio fast blue BL 50-100 conc. 10867B.	By			
859	Cyananthrol R		1,414	6,164	Germany, 100 per cent.
	Cyananthrol RBX powder.	B			
	Cyananthrol RX powder	B			
	Cyananthrol RXO	B			
	Cyananthrol RXG powder.	B			
860	Cyananthrol G		12,713	39,946	Germany, 91 per cent; Belgium, 9 per cent.
	Cyananthrol	B			
	Cyananthrol BGA	B			
	Cyananthrol BGA powder	B			
	Cyananthrol BGAO	B			
	Cyananthrol BGAOO	B			
	Cyananthrol BGAOO 90-100.	B			
	Cyananthrol BGAOO powder.	B			
	Cyananthrol BGAOO powder.	M			
851	Anthraquinone blue SR		853		Germany, 100 per cent.
	Anthraquinone blue SR extra powder.	B			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
862	Alizarin blue black		43,277	$30,329	Germany, 98 per cent; 1 per cent; Holland, cent.
	Alizarin blue black 3B	By			
	Alizarin blue black 3B powder.	By			
	Alizarin blue black 3B powder 11366 (P1).	By			
	Alizarin blue black B	M			
	Alizarin blue black B	C			
	Alizarin blue black B conc.	By			
	Alizarin blue black B conc. 11365 (P1).	By			
	Alizarin blue black B conc. 80-100.	By			
	Alizarin blue black B paste	M			
	Alizarin blue black B powder	B			
	Alizarin blue black B powder	By			
	Alizarin blue black B powder 725.	By			
	Alizarin blue black B powder 10364.	By			
	Alizarin blue black B powder 11364.	By			
	Alizarin blue black B powder 11364 (P1).	By			
	Alizarin blue black B powder 113644.	By			
	Alizarin blue black B powder conc. 70-100 11365a.	By			
	Alizarin blue black BT powder.	B			
	Alizarin blue black B powder conc. 80-100 11365B.	By			
863	Anthraquinone blue green		3,040	1,274	Germany, 96 per France, 4 per cent.
	Anthraquinone blue green	B			
	Anthraquinone blue green BX powder D.	B			
	Anthraquinone blue green BXO.	Q			
	Anthraquinone blue green BXO.	B			
	Anthraquinone blue green BXO powder.	B			
	Anthraquinone bluish green BX powder.	B			
864	Anthraquinone green GXNO powder.		1,161		Germany, 100 per cent.
	Anthraquinone green GXNO	B			
	Anthraquinone green GXNO powder.	B			
865	Alizarin direct green G		36,534	80,149	Germany, 94 per cent; 3 per cent; Belgium, cent.
	Alizarin cyanine green E conc. 80-100.	By			
	Alizarin cyanine green E powder 1-294.	By			
	Alizarin cyanine green E conc. powder 80-100 112944.	By			
	Alizarin cyanine green G	Q			
	Alizarin cyanine green G extra.	By			
	Alizarin cyanine green G powder 749.	By			
	Alizarin cyanine green G extra powder.	By			
	Alizarin cyanine green G extra powder.	B			
	Alizarin cyanine green G extra powder 749.	By			
	Alizarin cyanine green G extra powder 11292.	By			
	Alizarin cyanine green G extra powder 11292 (P1).	By			
	Alizarin cyanine green G extra powder 11292 (V).	By			
	Alizarin cyanine green G extra 24498 powder 11302 (P1).	By			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
865	Alizarin direct green G—Contd.		*Pounds.*		
	Alizarin cyanine green G extra powder conc. 11291B (V).	By			
	Alizarin cyanine green G extra powder conc. 70–100 11291A.	By			
	Alizarin cyanine green G extra powder conc. 80–100 11291.	By			
	Alizarin cyanine green G extra powder conc. 80–100 11291B.	By			
	Alizarin cyanine green G extra powder conc. 80–100 11291 B (V).	By			
	Alizarin cyanine green CG extra.	K			
	Alizarin direct green 5G	M			
867	Indanthrene brown (single strength).		11,558		Germany, 77 per cent; Italy 23 per cent.
	Indanthrene brown B double paste.	B			
868	Cibanone brown V paste		550	$1,999	Switzerland, 100 per cent.
	Cibanone brown V powder	I			
	Cibanone brown B powder	I			
	Cibanone brown B paste 20 per cent.	I			
869	Algol brown B (single strength)		6,640	12,047	Germany, 100 per cent.
	Algol brown R paste	By			
	Algol brown paste 11744 (PI).	By			
	Algol brown R paste 10–100 11744 (III).	By			
	Algol brown R powder 11599 (III).	By			
870	Algol corinth R (single strength).		2,037	1,364	Do.
	Algol corinth R paste 10 per cent 11750 (III).	By			
	Algol corinth R powder	By			
	Algol corinth R powder 1765.	By			
	Algol corinth R powder 11571	By			
	Algol corinth R powder 11571 (II).	By			
873	Helindone brown AN (single strength).		27,747	42,595	Germany, 98 per cent; Italy, 2 per cent.
	Helindone brown AN paste	M			
	Indanthrene pink B paste	B			
	Indanthrene pink B paste sand free.	B			
	Indanthrene pink B paste fine.	B			
	Indanthrene pink double paste.	B			
	Indanthrene pink BS powder	B			
	Indanthrene red violet RRN paste.	B			
	Indanthrene red violet RRN paste, sand free.	B			
	Indanthrene red violet RRN powder.	B			
	Indanthrene red violet 2 RN paste.	B			
	Indanthrene red violet 2RN paste, sand free.	Q			
	Indanthrene red violet RRNP paste.	B			
	Indanthrene red violet RRNP powder.	B			
874	Indigo, synthetic		70,975	84,901	
877	Indigo carmine extra	Q	30		England, 100 per cent.
881	Ciba blue 2B		99,937	126,817	Switzerland, 97.5 per cent; England, 2.0 per cent; Germany, 0.5 per cent.
	Ciba blue 2B powder	I			
	Ciba blue 2B powder pat	I			
	Ciba blue 2B pat	I			
	Ciba blue BB powder	Q			
	Ciba blue 2BD paste	I			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
881	Ciba blue 2B—Continued.				
	Ciba blue 2B D paste 16-100	I			
	Ciba blue 2B D paste pat	I			
	Ciba blue 2BD paste 16-100 pat.	I			
	Durindone blue 4B 20-100 paste.	BD			
	Durindone blue 4B	BD			
	Indigo KB 20-100 paste	K			
882	Ciba blue G		340		Switzerland, 98 per England, 2 per cent.
	Ciba blue G powder	I			
	Durindone blue 5B	BD			
883	Indigo KG (single strength)		3,811	12,161	Germany, 61 per cent land, 14 per cent; It per cent.
	Indigo 6B powder	M			
	Indigo MLB 6B powder	M			
	Durindone blue 6B	BD			
885	Brilliant indigo BD paste		12,656	7,870	Germany, 93 per cent; 7 per cent.
	Brilliant indigo BD paste	B			
	Brilliant indigo B paste	B			
	Brilliant indigo B paste base	B			
	Brilliant indigo BB paste 20-100.	B			
891	Ciba green		441		Switzerland, 100 per c
	Ciba green G paste 10-100	I			
892	Helindone green G		2,159		Germany, 100 per cent
	Helindone green G paste	M			
	Helindone green G powder	M			
893	Alizarin indigo G		1,776		England, 72 per cent many, 28 per cent.
	Alizarin indigo G paste 1628	By			
	Alizarin indigo G paste 20-100	By			
894	Alizarin indigo B		99		Germany, 100 per cent
	Alizarin indigo B paste	K			
895	Alizarin indigo 3R		1,799		Do.
	Alizarin indigo 3R paste	By			
	Alizarin indigo 3R paste 16-100, 11550 OA.	By			
897	Ciba heliotrope B		110		Switzerland, 100 per c
	Ciba heliotrope B powder paste.	I			
899	Ciba gray		440		Do.
	Ciba gray B powder	I			
	Ciba gray G powder	I			
901	Ciba violet B		21,987	36,643	Do.
	Ciba violet B paste	I			
	Ciba violet B paste 10-100	I			
	Ciba violet B powder	I			
	Ciba violet R paste	I			
	Ciba violet R paste 10-100	I			
	Ciba violet R powder	I			
902	Helindone brown 2R (single strength).		5,206	9,813	Germany, 100 per cent.
	Helindone brown 2R paste	M			
	Helindone brown 2R paste 10-100.	M			
	Helindone brown 2R powder	M			
904	Helindone brown G (single strength).		4,857	4,853	Do.
	Helindone brown G paste	M			
	Helindone brown G powder	M			
	Helindone brown CR paste	M			
	Helindone brown CH paste	M			
905	Thio indigo scarlet R		554		England, 92 per cent many, 8 per cent.
	Thio indigo scarlet R powder	K			
	Durindone scarlet R	BD			
906	Thio indigo scarlet G		6,122	6,888	Switzerland, 73 per Germany, 27 per cen
	Thio indigo scarlet 2G paste	K			
	Thio indigo scarlet 2G paste 20-100.	K			
	Ciba red G powder	I			
	Ciba red G paste	I			
	Ciba red G paste 10-100	I			
907	Ciba scarlet		10,695	26,685	Switzerland, 96 per Germany, 4 per cent
	Ciba scarlet G extra paste	I			
	Ciba scarlet G extra paste 20-100.	I			
	Ciba scarlet G extra powder	I			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
			Quantity.	Invoice value.	
			Pounds.		
908	Ciba red R paste 20 per cent	I.	110		Switzerland, 100 per cent.
910	Helindone pink		31,813	$56,249	Germany, 80 per cent; England, 12 per cent; Holland, 6 per cent; Italy, 2 per cent.
	Thio indigo pink AN paste	K.			
	Thio indigo rose AN paste	K.			
	Thio indigo rose BN paste	K.			
	Helindone pink AN paste	M.			
	Helindone pink AN paste 10–100.	M.			
	Helindone pink BN paste	M.			
	Helindone pink BN paste 10–100.	M.			
912	Thio indigo red B paste (single strength).		5,965	5,897	England, 34 per cent; Germany, 66 per cent.
	Thio indigo red B paste	K.			
	Thio indigo red B paste 20–100.	K.			
	Thio indigo red B powder	K.			
	Thio indigo red B powder 100 per cent.	K.			
	Durindone red B	BD.			
913	Helindone orange R		919	17,759	Germany, 100 per cent.
	Thio indigo orange R paste	K.			
	Helindone orange R paste 10–100.	M.			
	Helindone orange R powder	M.			
914	Helindone orange D powder	M.	33		Do.
917	Helindone red B powder		549		Do.
	Helindone red B paste	M.			
	Helindone red B paste 20–100.	M.			
918	Helindone red 3B		17,566		Do.
	Helindone red 3B paste	M.			
	Helindone red 3B paste 20–100.	M.			
919	Ciba bordeaux B		4,625	22,772	Switzerland, 100 per cent.
	Ciba bordeaux B	I.			
	Ciba bordeaux B paste	I.			
	Ciba bordeaux B powder	I.			
920	Helindone violet		2,425	9,324	Germany, 100 per cent.
	Helindone violet B paste	M.			
	Helindone violet B powder	M.			
	Helindone violet BB paste	M.			
	Helindone violet 2B paste 20–100.	M.			
	Helindone violet 2B powder	M.			
921	Helindone gray BB		882		Do.
	Helindone gray BB paste	M.			
923	Ursol		5,150	9,248	Do.
	Ursol D	A.			
	Ursol DB	A.			
	Ursol DF	A.			
	Ursol SA	A.			
	Ursol P	A.			
	Ursol SB crystals	A.			
	Ursol SLA	A.			
	Ursol 4G	A.			
	Ursol 4R	A.			
	Ursol A lumps	A.			
	Ursol D lumps	A.			
	Ursol gray AL	A.			
	Ursol gray B	A.			
	Ursol gray G	A.			
	Ursol gray R	A.			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity)
		Quantity.	Invoice value.	
		Pounds.		
Acetyl red		610		Germany, 100 per cent
Acetyl red BBX	B			
Acetyl red GX	B			
Acid blue		2,565		Switzerland, 90 per
Acid blue A	K			Germany, 10 per cent
Acid blue RBF	I			
Acid brown		537		Germany, 80 per cent
Acid brown 55	Q			land, 20 per cent.
Acid brown D Speine	C			
Acid magenta N	Q	50		
Acid milling black		10,165		Switzerland, 100 per ce
Acid milling black B	G			
Acid milling black B 652	G			
Acid milling red		871		Do.
Acid milling red R conc. 666	G			
Acid pure blue R supra 614	G	110		Do.
Acid ponceau E 640	G	529		Do.
Acid red		3,681	$1,553	Germany, 100 per cent
Acid red B	K			
Acid red 2B	K			
Acid red 4B	K			
Acid red SDG 20-100	M			
Acid red brown	Q	224		England, 100 per cent.
Acid rhodamine		4,166	11,887	Switzerland, 52 per
Acid rhodamine BG	B			Germany, 48 per cen
Acid rhodamine R	I			
Acid rhodamine 3R	I			
Acid rhodamine 3R conc	I			
Acid violet		163		Germany, 92 per cent;
Acid violet 6B SX extra	C			8 per cent.
Acid violet 7B	Q			
Alizarin brilliant green KG	C	84		England, 100 per cent.
Alizarin cyanole		668		Germany, 100 per cent
Alizarin cyanole EF	C			
Alizarin cyanole SR	C			
Alizarin direct violet		1,338		Do.
Alizarin direct violet E 2B	M			
Alizarin direct violet RC	M			
Alizarin delphinol		1,472		England, 100 per cent.
Alizarin delphinol BS	BD			
Alizarin emeraldole		991	2,352	Germany, 100 per cent
Alizarin emeraldole G	By			
Alizarin emeraldole G powder	By			
Alizarin emeraldole G powder 1340	By			
Alizarin emeraldole G powder (VI) 11349.	By			
Alizarin saphirole		5,905		Switzerland, 100 per c
Alizarin saphirole SAP	S			
Alizarin uranole R powder	By	622		Germany, 100 per cent
Alkali fast green		328		Germany, 70 per cent.
Alkali fast green 3G conc. 33-100	By			Holland, 30 per cent.
Alkali fast green 3G conc. 33-100 10553A	By			
Alphanol brown R 135 per cent	C	273		Germany, 100 per cent
Amido azo black EG	M	100		Do.
Amido red BL	M	100		Do.
Anthracyanine 3FL conc. 40-100	By	132		Do.
Anthosine		1,028		Do.
Anthosine B	B			
Anthosine 3B	B			
Anthosine 5B	B			
Azo acid black 3BL extra	M	1,001		Do.
Azo carmine		189		Do.
Azo carmine I	B			
Azo carmine I 30849	B			
Azo cyanine		573	954	Do.
Azo cyanine GR	K			
Azo cyanine GR extra	K			
Azo cyanine 5R	K			
Azo cyanole wool blue GR	K	125		Do.
Azo fast violet RR	C	1,380		Do.
Azo milling yellow 5G	Gr.E	100		Do.
Azo orsielle BB	C	200		Do.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
ne		6,553	$9,980	Switzerland, 100 per cent.
iodine 2B	S.			
iodine 6B	S.			
iodine 2G	S.			
violet 7R	C.	1,826		Germany, 100 per cent.
atent black 4AN extra	K.	368		Do.
	C.	201		Do.
nthrazurol		217		Do.
nt anthrazurol	B.			
nt anthrazurol G powder	B.			
lack blue R	K.	100		Do.
armine L conc	B.	100		Do.
anafuchsine		1,018		Do.
nt lanafuchsine BB	C.			
nt lanafuchsine 8L	C.			
nilling blue		2,175		Germany, 95 per cent; England, 5 per cent.
nt milling blue B 100 per cent	Q.			
nt milling blue B	C.			
nt milling blue R	K.			
nilling red		1,275	219	Germany, 100 per cent.
nt milling red	C.			
nt milling red G	C.			
nt milling red R	C.			
naphthol blue R	C.	185		Do.
ure yellow 6G extra 1648	By.	49		Do.
carlet		6,559	12,443	Germany, 66 per cent; France, 34 per cent.
nt scarlet FB conc	Q.			
nt scarlet G	C.			
nt scarlet G extra	C.			
nt scarlet 3R	C.			
nt scarlet 3R 85 per cent	C.			
nt scarlet 3R 90 per cent	C.			
nt scarlet 4R extra	C.			
nt scarlet (6)	C.			
nt scarlet (6) 50 per cent	C.			
nt scarlet (43)	C.			
nt scarlet (147) 90 per cent	C.			
nt scarlet (909)	C.			
d	Q.	22		France, 100 per cent.
		320	390	Switzerland, 100 per cent.
nine 0	S.			
nine 000	I.			
blue		23,782	26,455	Do.
fast blue BB	I.			
fast blue GTB	I.			
fast blue R	I.			
fast blue R extra	I.			
fast blue R conc	I.			
green G	I.	4		Do.
orange G conc	I.	110		Do.
red GR conc	I.	110		Do.
e fast black B	BD.	1,000		England, 100 per cent.
e violet R	BD.	1,120		Do.
onceau 6RW 1025	M.	337		Germany, 100 per cent.
carlet 6R	C.	185		Do.
ine 6R 60 Crystals	M.	807		Do.
acid blue R	BD.	13,454		England, 100 per cent.
ago red 111	G.	992		Switzerland, 100 per cent.
blue R conc. 673	G.	1,102		Do.
blue (paste)	G.	970		Canada, 100 per cent.
cyanine S conc. 672	G.	55		Switzerland, 100 per cent.
fuchsine		1,685		Do.
fast fuchsine BL conc. (573)	G.			
fast fuchsine BL 671	G.			
purple paste	G.	501		Canada, 100 per cent.
ine 2B conc. 646	G.	12,918		Switzerland, 100 per cent.
et		17,820	24,816	Do.
violet BC 505	G.			
violet BC 505 95–100	G.			
violet RL supra 620	G.			
violet RL supra 625	G.			
violet RL 670	G.			
violet RLC 359	G.			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Erythrine BG	M	403		Germany, 100 per cent.
Fast acid cyanine		2,287	$1,383	Do.
Fast acid cyanine GR P1 10583	By			
Fast acid cyanine GR conc. 75-100 10583A.	By			
Fast acid cyanine GR 10583	By			
Fast acid cyanine 5R 10584	By			
Fast acid cyanine 5R conc. 75-100 10584B.	By			
Fast acid cyanine SR P1 10584	By			
Fast acid green BB	M	100		Do.
Fast acid marine blue		300		Do.
Fast acid marine blue HBBX	B			
Fast acid marine blue HBBK	B			
Fast acid red	Q	112		England, 100 per cent.
Fast felt blue		476		Germany, 100 per cent.
Fast felt blue extra	C			
Fast felt blue extra 2484J	C			
Fast scarlet BX	B	500		Do.
Fast wool blue BL	B	50		Do.
Formic black		220		Switzerland, 100 per cent.
Formic black TG conc. 292	G			
Formic black C conc. 391	G			
Formyl blue BX	C	68		Germany, 100 per cent.
Gloria black N conc. 60-100	By	240		Do.
Hydra ine yellow IEG	Gr.E	100		Do.
Ink blue BITBNOO	Gr.E	3,535		Do.
Kiton fast orange G	I	661		Switzerland, 100 per cent.
Kiton fast red R	I	110		Do.
Kiton fast yellow		11,290		Do.
Kiton fast yellow 3G	I			
Kiton fast yellow	I			
Kiton red		11,738	16,877	Do.
Kiton red conc.	I			
Kiton red G	I			
Kiton red G conc.	I			
Kiton red 6B	I			
Kiton red S	I			
Kiton yellow		1,653		Do.
Kiton yellow 3G	I			
Kiton yellow S	S			
Milling red 6BA	A	225		Germany, 100 per cent.
Milling yellow		2,458		Do.
Milling yellow GA	A			
Milling yellow O	C			
Milling yellow R	A			
Naphthalene black AB	P	24		France, 100 per cent.
Naphthalene blue B	M	200		Germany, 100 per cent.
Naphthalene green NV	P	2,220		France, 100 per cent.
Naphthol dark green G	C	392		Germany, 100 per cent.
Navy blue A	I	1,323		Switzerland, 100 per cent.
Nerol 2B	A	1,500		Germany, 100 per cent.
Nerol black 2B	K	150		Do.
Nero cyanine		272		Do.
Nero cyanine BS	K			Do.
Nero cyanine BN	K			Do.
Neutral cloth blue R 669	G	551		Switzerland, 100 per cent.
Orange 3RL	Gr.E	50		Germany, 100 per cent.
Ortho cyanine B	A	500		Do.
Oxy acid blue 6B	Gr.E	100		Do.
Oxy acid red BB	Gr.E	100		Do.
Oxy acid violet ROO	Gr.E	100		Do.
Palatine light yellow RX	B	481		Do.
Patent black		2,401	233	Do.
Patent black I	C			
Patent black II	C			
Patent black N	C			
Polar red C conc. 596	G	2,579		Switzerland, 100 per cent.
Pure blue for printing	I	5,622		Do.
Rhodamine Pon'eau G extra	M	42		Germany, 100 per cent.
Rocceline scarlet	Q	66		France, 100 per cent.
Seto flavine T 393	G	110		Switzerland, 100 per cent.
Silk scarlet	S	50		Do.
Special blue G	B	150		Germany, 100 per cent.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Sulphon orange G	By.	1,268		Germany, 100 per cent.
Sulphon yellow		2,054	$1,099	Do.
Sulphon yellow R conc. 10469	By.			
Sulphon yellow R conc. 30-100 10469A	By.			
Sulphon yellow R conc. 35-100 10469C	By.			
Sulphon yellow 5G	By.			
Sulphon yellow 5G conc. 35-100	By.			
Supramine black BR 1598	By.	49		Do.
Supramine yellow R	K.	200		Do.
Tolane fast red		882		Do.
Tolane fast red 2BL	K.			
Tolane fast red 6BL	K.			
Victoria fast violet		1,925	2,506	Do.
Victoria fast violet 2R extra	By.			
Victoria fast violet 2R extra PI 10613	By.			
Victoria fast violet 2R extra (VIII) 10613.	By.			
Victoria fast violet 2R extra 10613	By.			
Victoria scarlet		2,335		Do.
Victoria scarlet K 2Z	M.			
Victoria scarlet K 3G	M.			
Victoria yellow	Q.	9		
Violet blue acid 7B	Q.	11		France, 100 per cent.
Violet for wool 8B double conc	Q.	275		Belgium, 100 per cent.
Wool blue		69,719		Switzerland, 100 per cent.
Wool blue RL 647	G.			
Wool blue RL 447	G.			
Wool blue extra conc	Q.			
Wool fast blue		4,433	5,514	Germany, 99 per cent; Holland, 1 per cent.
Wool fast blue BL	By.			
Wool fast blue BL conc	Q.			
Wool fast blue BL (VIII) 10564B	By.			
Wool fast blue BL 10564B	By.			
Wool fast blue BL conc. 50-100 10564D	By.			
Wool fast blue GL conc. 50-100 10564G	By.			
Wool fast marine blue BB	B.	50		Germany, 100 per cent.
Wool fast yellow		151	447	Do.
Wool fast yellow G	B.			
Wool fast yellow 5GX	B.			
Wool violet RLF	K.	250		Do.
Xylene cyanol FF extra	S.	500		Switzerland, 100 per cent.
Xylene fast green B	S.	1,501		Do.

UNIDENTIFIED VAT COLORS.

Algol blue C		3,045		Germany, 100 per cent.
Algol blue C paste 11739 (IV) 10-100	By.			
Algol blue C powder 11739A	By.			
Algol brown G powder 11600	By.	35		Do.
Algol yellow S paste	K.	498		Do.
Chloranthrene Bordeaux 12½ per cent	BD.	10		England, 100 per cent.
Chloranthrene red 5GY paste	BD.	10		Do.
Ciba rose		1,870	$4,937	Switzerland, 100 per cent.
Ciba rose BG paste	I.			
Ciba rose BG powder	I.			
Ciba rose BG powder patent	I.			
Duranthrene blue RDX	BD.	10		England, 100 per cent.
Duranthrene brown B	BD.	10		Do.
Duranthrene dark blue BO	BD.	10		Do.
Duranthrene red violet		2,274		Do.
Duranthrene red violet 2RN	BD.			
Durindone red Y	BD.	10		Do.
Helindone black 3B	M.	4,409		Germany, 100 per cent.
Helindone red BB	M.	152		England, 100 per cent.
anthrene blue		5,620		Germany, 100 per cent.
Indanthrene blue RC paste	B.			
Indanthrene blue RZ paste	B.			
Indanthrene blue G 2Z powder	B.			
Indanthrene blue RC powder	B.			
Indanthrene brown		888		Do.
Indanthrene brown 3R paste fine	B.			
Indanthrene brown RR paste	B.			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED VAT COLORS—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Indanthrene golden orange		1,223		Germany, 100 per cent.
Indanthrene golden orange RN extra paste.	B			
Indanthrene golden orange 3R paste	B			
Indanthrene violet		7,124		Germany, 47 per cent; England, 36 per cent; Belgium, 17 per cent.
Indanthrene violet BN extra paste	B			
Indanthrene violet BN extra paste	Q			
Indanthrene violet BN paste	Q			
Indigo		2,590		England, 100 per cent.
Indigo LL 2R	BD			
Indigo LL powder	BD			
Thio indigo black B double conc	K	123		Germany, 100 per cent.
Thio indigo pink RN paste	B	180		Do.
Thio indigo violet 2R paste	K	687		Do.
Vat pink		200		Do.
Vat pink AN paste	B			

UNCLASSIFIED MORDANT AND CHROME DYES.

Acid alizarin black		5,668	$3,214	Germany, 100 per cent.
Acid alizarin black ENT conc	M			
Acid alizarin black ET	M			
Acid alizarin black SET powder	M			
Acid alizarin black SN	M			
Acid alizarin brown		2,054		Do.
Acid alizarin brown B	M			
Acid alizarin brown BR	M			
Acid alizarin gray		2,818		Do.
Acid alizarin gray G	M			
Acid alizarin gray S	M			
Acid alizarin green 2B	M	379		Do.
Alizarin black		3,136		Do.
Alizarin black SF	B			
Alizarin black SP paste	B			
Alizarin blue		8,922	7,271	England, 60 per cent; Germany, 35 per cent; Holland, 5 per cent.
Alizarin blue	Q			
Alizarin blue F	M			
Alizarin blue RR	M			
Alizarin blue SBW	M			
Alizarin blue SCB paste 20-100	Q			
Alizarin blue SW powder 11390(PV)	By			
Alizarin blue WC paste	B			
Alizarin blue WNN paste	B			
Alizarin blue soluble powder	Q			
Alizarin blue black		400		Germany, 100 per cent.
Alizarin blue black BB double paste	B			
Alizarin cyanine green		4,861	1,143	Do.
Alizarin cyanine green EFP powder	By			
Alizarin cyanine green 3G powder	By			
Alizarin cyanine green 3G powder 11297(PI)	By			
Alizarin dark blue WW paste	B	4,418		Do.
Alizarin fast black SP powder (11368)	By	432		Do.
Alizarin geranole B powder	By	1,482		Do.
Alizarin green		1,045	579	England, 86 per cent; Germany, 14 per cent.
Alizarin green 15 paste	M			
Alizarin green BGX 10-100	Q			
Alizarin green AGS 15-100	Q			
Alizarin indole R powder 1130	By	99		Germany, 100 per cent.
Alizarin red		6,177	284	Do.
Alizarin red 2AG	M			
Alizarin red CR 20-100	M			
Alizarin red 5F 20-100	M			
Alizarin red PS powder 11378(PI)	By			
Alizarin red SS powder	B			
Alizarin red WR paste	B			
Anthracene acid black 3R	C	1,065		Do.
Anthracene acid blue		543		Do.
Anthracene acid blue ER	C			
Anthracene acid blue KBB	C			
Anthracene blue R double paste	B	25		Do.
Anthracene blue black UG	C	377		Do.
Anthracene brown WLP paste	BD	6,720		England, 100 per cent.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED MORDANT AND CHROME DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Anthracene chromate black		675		Germany, 100 per cent.
Anthracene chromate black D	C			
Anthracene chromate black LC	C			
Anthracene chromate blue	C	51		Do.
Anthracene chromate brown		12,694	$15,985	Germany, 92 per cent; England, 5 per cent; Italy, 3 per cent.
Anthracene chromate brown EB	C			
Anthracene chromate brown EB extra	C			
Anthracene chromate brown EB extra 90 per cent.	C			
Anthracene chromate brown EB 90 per cent.	L			
Anthracene chromate brown EB 100 per cent.	Q			
Anthracene chromate brown EB 100 per cent.	C			
Anthracene chromate brown RR	C			
Anthracene chromate green FF	C	99		Germany, 100 per cent.
Anthracene chrome black		2,041	180	Do.
Anthracene chrome black KLT	C			
Anthracene chrome black KV	C			
Anthracene chrome black PBB	C			
Anthracene chrome black 5611Z	C			
Anthracene chrome blue H	C	670		Do.
Anthracene chrome brown SWN	C	1,120		Do.
Anthracene dark blue	B	284		Do.
Anthracene direct green B	C	128		Do.
Brilliant alizarin cyanine 3G powder	Q	752		Do.
Brilliant chrome blue G 50 per cent	G	441		Switzerland, 100 per cent.
Chromal blue GC (for printing) 939	G	220		Do.
Chromacetin blue S powder	DH	110		Do.
Chrome black		1,081		Germany, 100 per cent.
Chrome black AGZZ	K			
Chrome black B	M			
Chrome blue S	G	2,756		Switzerland, 100 per cent.
Chrome Bordeaux B powder	DH	100		Do.
Chrome brown 17675 powder	DH	110		Do.
Chrome cyanine G	By	229		Germany 100 per cent.
Chrome fast blue		771		Switzerland, 100 per cent.
Chrome fast blue BX	I			
Chrome fast blue 2R	I			
Chrome fast brown		2,751		Do.
Chrome fast brown	I			
Chrome fast brown TV	I			
Chrome fast green GL	I	220		Do.
Chrome fast violet B	I	562		Do.
Chrome olive JCSB powder	DH	110		Do.
Chromazurine G powder	DH	55		Do.
Chromochlorine G powder	DH	220		Do.
Chromorhoduline		310		Do.
Chromorhoduline B powder	DH			
Chromorhoduline 6G extra powder	DH			Do.
Chromosafranine B powder	DH	100		Do.
Chromoxamine violet		1,263		Germany, 100 per cent.
Chromoxamine violet B	By			
Chromoxamine violet 5B	By			
Coeruleine H powder	B	242		Do.
Diamond red 5G 1521	By	315		Do.
Erio chrome blue S 955	G	110		Switzerland, 100 per cent.
Erio chrome brown ROS 933	G	1,213		Do.
Erio chrome flavine A conc. 1015	G	110		Do.
Erio chrome green HK 1031	G	551		Do.
Erio chrome red PEI 1035	G	1,587		Do.
Erio chrome violet		6,812		Do.
Erio chrome violet B 918	G			
Erio chrome violet 3B 941	G			
Fast chrome green B powder	DH	110		Do.
Fast mordant blue		3,072		Germany, 100 per cent.
Fast mordant blue B	M			
Fast mordant blue KR	M			
Fast mordant blue KRL	M			
Lanasol brown 2R pat	I	220		Switzerland, 100 per cent.
Lanasol green G		885		Do.
Lanasol green G	I			
Lanasol green G conc	I			
Lanasol orange		353		Do.
Lanasol orange G	I			
Lanasol orange 2R	I			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED MORDANT AND CHROME DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin age of quanti
		Quantity.	Invoice value.	
		Pounds.		
Lanasol red		881		Switzerland, 100 p
Lanasol red G	I			
Lanasol red G conc	I			
Lanasol violet		440		Do.
Lanasol violet B paste	I			
Lanasol violet R paste	I			
Lanasol yellow		1,322		Do.
Lanasol yellow G paste	I			
Lanasol yellow G conc	I			
Metachrome blue black		725		Germany, 100 per c
Metachrome blue black 2BX	A			
Metachrome blue black R	A			
Monochrome brown		1,888		Do.
Monochrome brown E	K			
Monochrome brown E, 286 per cent	K			
Mordant fast yellow E powder	B	50		Do.
Mounsey olive brown		1,060		England, 100 per ce
Mounsey olive brown	Q			
Mounsey olive brown G powder	Q			
Omega chrome brown		5,486		Switzerland, 100 pe
Omega chrome brown P	S			
Omega chrome brown PB	S			
Omega chrome brown PB conc	S			
Omega chrome red B	S	1,662		Do.
Oxychrome black FVOOO	GrE	3,000		Germany, 100 per c
Oxychrome blue black 6BNOO	GrE	100		Do.
Potting black B	I	11,023		Switzerland, 100 pe
Salicine blue B	K	245		Germany, 100 per c
Salicine blue black AE	K	1,257		Do.
Salicine Bordeaux RF	K	50		Do.
Salicine brown RE	K	200		Do.
Salicine dark green CS	K	77		Do.
Salicine orange 2R	K	231		Do.
Salicine red B	K	282		Do.
Salicine violet R	K	132		Do.

UNCLASSIFIED DIRECT DYES.

Azo diamine orange 2R	Q	432		Italy, 80 per cent; 20 per cent.
Benzo Bordeaux		491		Germany, 100 per c
Benzo Bordeaux 6B PI10034	By			
Benzo Bordeaux 6B conc. 50-100 10034A	By			
Benzo brilliant violet 2R	K	200		Do.
Benzo bronze E		331		Italy, 100 per cent.
Benzo bronze E	By			
Benzo bronze E1996	B			
Benzo chrome black blue B conc. 50-100	By	4,122		Germany, 100 per c
Benzo chrome black pure blue B	By	2,593		Do.
Benzo chrome blue black		475		Germany, 86 p France, 14 per cen
Benzo chrome blue black B	By			
Benzo chrome blue black B conc	P			
Benzo chrome brown		3,439	$3,847	Germany, 80 per c land, 20 per cent.
Benzo chrome brown B	By			
Benzo chrome brown B670	By			
Benzo chrome brown G	By			
Benzo chrome brown G671	By			
Benzo chrome brown 5G 10211	By			
Benzo chrome brown 5G (VI) 10211	By			
Benzo copper blue		1,259	1,742	Germany, 100 per c
Benzo copper blue 2B	By			
Benzo copper blue 2B conc	By			
Benzo copper blue B PI10163	By			
Benzo fast black		4,912	5,255	Germany, 88 per c gium, 8 per cent; 4 per cent.
Benzo fast black	By			
Benzo fast black L	By			
Benzo fast black L (1425)	By			
Benzo fast black L (10268)	By			
Benzo fast black L conc. 78-100	By			
Benzo fast black L PI10268	By			
Benzo fast black L (VI) 10268	By			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Benzo fast black—Continued.				
Benzo fast black L 100 per cent	Q			
Benzo fast black S	K			
Benzo fast blue		3,122	$7,252	Germany, 96 per cent; England, 4 per cent.
Benzo fast blue FFL	By			
Benzo fast blue FFL 10179	By			
Benzo fast blue FFL	B			
Benzo fast blue G PI10176	By			
Benzo fast Bordeaux 6BL	Q	22		Italy, 100 per cent.
Benzo fast brown		3,601	5,865	Germany, 100 per cent.
Benzo fast brown GL 10258	By			
Benzo fast brown RL	By			
Benzo fast brown RL 10257	By			
Benzo fast heliotrope		2,189	5,923	Do.
Benzo fast heliotrope BL	By			
Benzo fast heliotrope BL conc. 50-100 10207A.	By			
Benzo fast heliotrope 4BL	By			
Benzo fast heliotrope 4BL 1759	By			
Benzo fast heliotrope 2RL	By			
Benzo fast heliotrope 2RL 10208	By			
Benzo fast heliotrope 2RL 10208(VI)	By			
Benzo fast orange		2,918	3,844	Do.
Benzo fast orange 2RL	By			
Benzo fast orange 2RL 10086	By			
Benzo fast orange S PI10085	By			
Benzo fast orange S 70-100	By			
Benzo fast orange S conc. 75-100	By			
Benzo heliotrope	K	50		Do.
Benzo red		1,843	1,179	Germany, 77 per cent; Holland, 23 per cent.
Benzo red 12B	By			
Benzo red 12B 10009 (VI)	By			
Benzo red 12B conc. 50-100	By			
Benzo rhoduline red		3,950	785	Germany, 94 per cent: Italy, 6 per cent.
Benzo rhoduline red	K			
Benzo rhoduline red B	By			
Benzo rhoduline red B conc. 30-100	By			
Benzo rhoduline red 3B	By			
Benzoform scarlet B (10307)	By	522		Germany, 100 per cent.
Brilliant benzo green B 936	By	297		Do.
Brilliant benzo violet		1,510	3,996	Do.
Brilliant benzo violet B	By			
Brilliant benzo violet B 50-100	By			
Brilliant benzo violet B 1389	By			
Brilliant benzo violet B 10205 (PIII)	By			
Brilliant benzo violet 2R 1388	By			
Brilliant benzo violet 2R conc. 40-100	By			
Brilliant copper blue GW	A	100		Do.
Brilliant fast blue		3,943	11,178	Do.
Brilliant fast blue 2G	By			
Brilliant fast blue 2G conc. 60-100	By			
Brilliant fast blue B	By			
Brilliant fast blue 2G conc. 60-100 10182A.	By			
Brilliant fast blue 3X 1577	By			
Brilliant fast blue 3BX	By			
Brilliant sky blue		5,341		Germany, 64 per cent; England, 36 per cent.
Brilliant sky blue 8G extra	Q			
Brilliant sky blue 2RM	By			
Chicago red III	G	2,755		Switzerland, 100 per cent.
Chloramine brilliant red		4,932	69,684	Do.
Chloramine brilliant red	S			
Chloramine brilliant red 8B	S			
Chloramine brilliant red 8B conc	S			
Chloramine brilliant red 8B conc. pure	S			
Chloramine red		4,028		Germany, 72 per cent; Italy, 26 per cent; England, 2 per cent.
Chloramine red 8BS	By			
Chloramine red 8BS 1180	By			
Chloramine red 8BS (PI10031)	By			
Chloramine red 8BS conc. 60-100	By			
Chloramine violet FFB	By	265		Germany, 100 per cent.
Chlorantine fast black		1,102		Switzerland, 100 per cent.
Chlorantine fast black B	I			
Chlorantine fast black B conc	I			
Chlorantine fast blue		5,070		Do.
Chlorantine fast blue 2GL	I			
Chlorantine fast blue 2GL conc	I			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (p age of quantity)
		Quantity.	Invoice value.	
		Pounds.		
Chlorantine fast Bordeaux		2,534		Switzerland, 100 per c
Chlorantine fast Bordeaux 2BL	I.			
Chlorantine fast Bordeaux 2BL conc.	I.			
Chlorantine fast brown		4,589	$9,398	Do.
Chlorantine fast brown 2GL	I.			
Chlorantine fast brown RL	I.			
Chlorantine fast brown RL conc.	I.			
Chlorantine fast orange		2,348		Do.
Chlorantine fast orange TRL	I.			
Chlorantine fast orange TRL conc.	I.			
Chlorantine fast red		3,072		Do.
Chlorantine fast red 7BL	I.			
Chlorantine fast red 7BL conc.	I.			
Chlorantine fast rubine		440		Do.
Chlorantine fast rubine RL conc.	I.			
Chlorantine fast rubine RL paste	I.			
Chlorantine fast violet		5,622	10,171	Do.
Chlorantine fast violet BL	I.			
Chlorantine fast violet BL conc.	I.			
Chlorantine fast violet 4BL	I.			
Chlorantine fast violet 4BL conc.	I.			
Chlorantine fast violet 2RL	I.			
Chlorantine fast yellow		3,637	6,642	Do.
Chlorantine fast yellow 4GL	I.			
Chlorantine fast yellow 4GL conc.	I.			
Chlorantine fast yellow RL	I.			
Chlorantine light blue 2BL	I.	441		Do.
Chlorantine light yellow 4GL	I.	441		Do.
Chlorantine orange TRL	I.	661		Do.
Chlorazol brown		3,540	4,258	England, 100 per cent.
Chlorazol brown G	BD.			
Chlorazol brown GM	BD.			
Chlorazol brown RD	BD.			
Chlorazol fast red K	BD.	2,150		Do.
Chlorazol violet R	BD.	300		Do.
Chromanile black		400		Germany, 100 per cent.
Chromanile black BF	Q.			
Chromanile black 2F extra	A.			
Columbia Bordeaux B	A.	112		Do.
Columbia fast scarlet 4B	A.	51		Do.
Columbia violet R	A.	100		Do.
Copper blue B extra	M.	776		Do.
Cotton brown W	C.	1,001		Do.
Cupranil brown		2,666	3,926	Switzerland, 100 per cen
Cupranil brown G	I.			
Cupranil brown G conc.	I.			
Cupranil brown R	I.			
Cupranil brown R conc.	I.			
Cutch brown RR	S.	220		Do.
Diamine azo blue R	C.	117		Germany, 100 per cent.
Diamine azo orange RR	C.	541		Do.
Diamine azo scarlet		1,600	1,156	Do.
Diamine azo scarlet A	C.			
Diamine azo scarlet BBL extra	C.			
Diamine azo scarlet 8B extra	C.			
Diamine azo scarlet 4BL extra	C.			
Diamine azo scarlet 6BL extra	C.			
Diamine brilliant orange SS	C.	710		Do.
Diamine brilliant scarlet S	C.	972		Do.
Diamine Bordeaux S	C.	172		Do.
Diamine catechine		7,545	9,108	Do.
Diamine catechine B	C.			
Diamine catechine B	K.			
Diamine catechine G	C.			
Diamine catechine GR conc.	C.			
Diamine catechine GXN	C.			
Diamine catechine 3G	C.			
Diamine dark blue B	C.	269		Do.
Diamine fast black X	C.	514		Do.
Diamine fast blue		15,323	20,501	Do.
Diamine fast blue CG	C.			
Diamine fast blue FFB	C.			
Diamine fast blue FFB	K.			
Diamine fast blue FFC	C.			
Diamine fast blue FFG	C.			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Diamine fast Bordeaux		1,331		Germany, 100 per cent.
Diamine fast Bordeaux 6BA	C			
Diamine fast Bordeaux 6BS	C			
Diamine fast brown		3,529	$2,826	Do.
Diamine fast brown G	C			
Diamine fast brown GB	C			
Diamine fast brown R	C			
Diamine fast orange		6,261		Do.
Diamine fast orange EG	C			
Diamine fast orange ER	C			
Diamine fast rose		117		Do.
Diamine fast rose BBF	C			
Diamine fast rose G	C			
Diamine fast scarlet		2,826	5,935	Do.
Diamine fast scarlet 4BS	C			
Diamine fast scarlet 6BS	C			
Diamine fast scarlet 8BSX	C			
Diamine fast scarlet 8BN	C			
Diamine fast violet FFR	C	551		Do.
Diamine heliotrope		628		Do.
Diamine heliotrope B	C			
Diamine heliotrope O	C			
Diamine jet black OO	C	200		Do.
Diamine nitrazol green GF	C	254		Do.
Diamine orange		160		France, 50 per cent.
Diamine orange B	P			Belgium, 50 per cent.
Diamine orange B	C			
Diamine phosphine D	C	50		Germany, 100 per cent.
Diamine purpurine 6B	C	278		Do.
Diamine steel blue L	C	11		Do.
Diamine yellow	Q	500		France, 100 per cent.
Diamineral blue R	C	20		Germany, 100 per cent.
Diaminogene sky blue N	C	847		Do.
Dianil black ES	M	1,533		Do.
Dianil blue H 2G	M	1,649		Do.
Dianil brown MH	M	637		Do.
Dianil chrome brown R	M	500		Do.
Dianil Japonine G	M	350		Do.
Dianil red 10B	M	611		Do.
Dianil violet		1,558	179	Do.
Dianil violet BE	M			
Dianil violet BE conc	M			
Dianil violet H	M			
Dianil yellow	C	276		Do.
Dianol dark blue B	BD	2,240		England, 100 per cent.
Dianol fast blue 2B	BD	1,000		Do.
Dianol fast orange D	BD	1,120		Do.
Dianol violet R	BD	1,120		Do.
Diazanil pink B	M	257		Germany, 100 per cent.
Diazo blue black T	K	2,205		Do.
Diazo Bordeaux		1,126	1,582	Do.
Diazo Bordeaux	By			
Diazo Bordeaux PI 10404	By			
Diazo Bordeaux 7B	By			
Diazo Bordeaux 7BC 160	By			
Diazo Bordeaux 7BC 598	By			
Diazo Bordeaux 7B 1312	By			
Diazo brilliant orange		437	571	England, 68 per cent; Germany, 32 per cent.
Diazo brilliant orange GR extra	M			
Diazo brilliant orange GR extra 1716	By			
Diazo brilliant orange 5G extra	By			
Diazo brilliant scarlet		3,578	7,768	Germany, 76 per cent; England, 24 per cent.
Diazo brilliant scarlet extra BA	K			
Diazo brilliant scarlet extra BA	By			
Diazo brilliant scarlet G	By			
Diazo brilliant scarlet ROA extra	By			
Diazo brilliant scarlet S 4B	By			
Diazo brilliant scarlet 2B extra conc. (10394)	By			
Diazo brilliant scarlet 3B extra (1274)	By			
Diazo brilliant scarlet 3B extra (10390)	By			
Diazo brilliant scarlet 6B extra (C602)	By			
Diazo brilliant scarlet 6B extra (1275)	By			
Diazo brilliant scarlet 2BL extra conc.	By			
Diazo brilliant scarlet 2BL extra conc. 1344	By			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Diazo brilliant scarlet—Continued.				
Diazo brilliant scarlet 2BL extra conc. (10394PI).	By			
Diazo brilliant scarlet 2BL extra conc. (10394 VII).	By			
Diazo brilliant scarlet 4BL extra conc.	By			
Diazo brown		1,077	$1,788	Germany, 100 per cent.
Diazo brown G	By			
Diazo brown G (10432)	By			
Diazo brown NR	By			
Diazo brown 3G 1811	By			
Diazo brown 3RB 1881	By			
Diazo fast blue		1,102		Switzerland, 100 per cent.
Diazo fast blue 2BW	I			
Diazo fast blue 2BW conc	I			
Diazo fast Bordeaux		718		Germany, 100 per cent.
Diazo fast Bordeaux BL	By			
Diazo fast Bordeaux BL 1731	By			
Diazo fast red		1,135		Do.
Diazo fast red 5BL 1875	By			
Diazo fast red 7BL	By			
Diazo fast violet		559	447	Do.
Diazo fast violet BL	By			
Diazo fast violet 3RL	By			
Diazo fast violet 3RL (10431PIII)	By			
Diazo fast yellow		218		Do.
Diazo fast yellow G 1798	By			
Diazo fast yellow 2G	By			
Diazo geranine		383		Do.
Diazo geranine B extra 10400	By			
Diazo geranine B extra PI 10400	By			
Diazo indigo black L 100 per cent	By	100		Do.
Diazo indigo blue		277		Italy, 81 per cent; Germany, 19 per cent.
Diazo indigo blue 4GL extra	By			
Diazo indigo blue 4GL extra (10420PI)	Q			
Diazo indigo blue 4GL extra (1730)	By			
Diazo navy blue BP2S	GrE	110		Germany, 100 per cent.
Diazo olive		201		Do.
Diazo olive G (10409PIII)	By			
Diazo olive G (10409)	By			
Diazo phenyl black		1,415		Switzerland, 100 per cent.
Diazo phenyl black 3B 381	G			
Diazo phenyl black V 360	G			
Diazo rubine		3,113		England, 87 per cent.
Diazo rubine B	By			Germany, 13 per cent.
Diazo rubine B 1117	By			
Diazo rubine B 10386	By			
Diazo rubine B (10386PI)	By			
Diazo rubine B 10386 (VII)	By			
Diazo scarlet 3BA extra	Q	62		Italy, 100 per cent.
Diazo sky black B	K	2,924		Germany, 100 per cent.
Diazo sky blue		6,892	8,597	Germany, 98 per cent; Italy, 2 per cent.
Diazo sky blue B (10426PIII)	By			
Diazo sky blue B 1528	By			
Diazo sky blue B 95 per cent	K			
Diazo sky blue 3G	By			
Diazo sky blue 3G 1527	By			
Diazo sky blue 3G powder	By			
Diazo yellow R 1799	By	46		Germany, 100 per cent.
Diphenyl fast blue		1,322		Switzerland, 100 per cent.
Diphenyl fast blue FB conc. 383	G			
Diphenyl fast blue FB supra 379	G			
Diphenyl fast Bordeaux		595		Do.
Diphenyl fast Bordeaux B conc	G			
Diphenyl fast Bordeaux G conc. 366	G			
Diphenyl fast gray BC 254	G	110		Do.
Direct brown		6,734	4,187	Switzerland, 98 per cent; England, 2 per cent.
Direct brown 5G	I			
Direct brown KR	Q			
Direct brown TBS 818	G			
Direct catechine GR conc	I	386		Switzerland, 100 per cent.
Direct cutch brown		6,614	9,601	Do.
Direct cutch brown B	I			
Direct cutch brown B conc	I			
Direct cutch brown GR	I			
Direct cutch brown GR conc	I			

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNCLASSIFIED DIRECT DYES—Continued.

Name of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
Direct deep black T	By.	99		Germany, 100 per cent.
Direct fast black B	I.	1,322		Switzerland, 100 per cent.
Direct fast orange SE	I.	441		Do.
Direct fast scarlet 4BS	C.	198		Germany, 100 per cent.
Direct gray		1,494		France, 100 per cent.
Direct gray F	P.			
Direct safranine		440		Switzerland, 100 per cent.
Direct safranine RW	I.			
Direct safranine RW conc	I.			
Indigene blue RW conc	I.	110		Do.
Janus black I	M.	500		Germany, 100 per cent.
Naphthamine black AB extra	K.	311		Do.
Naphthamine direct blue 2R	K.	100		Do.
Naphthamine fast black		1,382		Do.
Naphthamine fast black 8F	K.			
Naphthamine fast black KSG extra	K.			
Naphthamine fast brown RL	K.	200		Do.
Naphthogene blue		12,023	$14,367	Germany, 93 per cent.
Naphthogene blue B	A.			Italy, 5 per cent.
Naphthogene blue 2R	Q.			Holland, 2 per cent.
Naphthogene blue 2R	A.			
Naphthogene blue 4R	Q.			
Naphthogene blue 4R	A.			
Naphthogene indigo blue R	A.	100		Germany, 100 per cent.
Naphthogene pure blue 4B	A.	100		Do.
Oxamine black BB	B.	500		Do.
Oxamine brilliant violet RX	B.	25		Do.
Oxamine chrome violet SB	By.	994		Do.
Oxamine fast blue BX	B.	228		Do.
Oxamine fast pink		152		Do.
Oxamine fast pink BNE	B.			
Oxamine fast pink BX conc	B.			
Oxamine light blue		625		Do.
Oxamine light blue B	B.			
Oxamine light blue G	B.			
Oxamine light brown R	B.	113		Do.
Oxy diamine black		120		Do.
Oxy diamine black 5000	C.			
Oxy diamine black N	C.			
Oxy diamine brown RN	C.	498		Do.
Oxy diamine red 8	C.	225		Do.
Oxy diaminogene ED	C.	400		Do.
Parasilfon brown G	S.	882		Do.
Patent dianil black		2,240		Do.
Patent dianil black EB conc	M.			
Patent dianil black EB extra conc	M.			
Pluto black		1,345		Do.
Pluto black CF extra conc. 60/100	By.			
Pluto black G (10289 PI)	By.			
Polyphenyl blue GC 103	G.	2,579		Switzerland, 100 per cent.
Polyphenyl yellow RC 115	G.	3,637		Do.
Pyramine G	L.	83		Germany, 100 per cent.
Pyrazol orange		16,845		Switzerland, 100 per cent.
Pyrazol orange G	S.			
Pyrazol orange G conc	S.			
Rosanthrene		4,908	7,824	Do.
Rosanthrene B conc	I.			
Rosanthrene R	I.			
Rosanthrene R conc	I.			
Rosanthrene Bordeaux		4,739		Do.
Rosanthrene Bordeaux B	I.			
Rosanthrene Bordeaux B conc	I.			
Rosanthrene orange R conc	I.	551		Do.
Rosanthrene pink	I.	992		Do.
Solamine blue FF	A.	1,500		Germany, 100 per cent.
Triazol blue		992		Do.
Triazol blue BOOO	Gr.E.			
Triazol blue BOOO	Q.			
Trisulfone bronze B	S.	441		Switzerland, 100 per cent.
Trisulfone violet N	S.	1,501		Do.
Union black M No. 8	M.	2,090		Germany, 100 per cent.
Union blue BD M 3	M.	3,686		Do.
Zambesi black V	A.	1,752		Do.
Zambesi Bordeaux 7B	A.	200		Do.
Zambesi Red 4B	A.	132		Do.
Zambesi scarlet 6B extra	K.	250		Do.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

UNIDENTIFIED SULPHUR DYES.

Name of dye.	Manufacturer.	Imports.		Countries of origin (p age of quantity
		Quantity.	Invoice value.	
		Pounds.		
Cross dye green		51,074	$49,646	England, 100 per cent
Cross dye green	BD			
Cross dye green B	BD			
Cross dye green 2G conc.	BD			
Cross dye yellow Y	BD	548		Do.
Disulphine blue 87724	BD	2,240		Do.
Eclipse brown		21,248	9,947	Switzerland, 100 per c
Eclipse brown BK 371	G			
Eclipse brown 3GK	G			
Eclipse brown 3GK 306	G			
Immedial direct blue B	C	320		Germany, 100 per cent
Immedial indogene		2,379		Do.
Immedial indogene B	C			
Immedial indogene AGG extra conc.	C			
Katigene bronze GL(XI)11536	By	6		Do.
Katigene direct blue		12		Do.
Katigene direct blue B extra conc. 11493(XI).	By			
Katigene direct blue RF extra conc. 11495(XI).	By			
Katigene yellow brown		12		Do.
Katigene yellow brown RL 11520(XI)	By			
Katigene yellow brown 3RL 11521(XI)	By			
Katigene yellow GR extra (XI) 11453	By	6		Do.
Pyrogene brown		949		Switzerland, 100 per c
Pyrogene brown RS yellow shade	Q			
Pyrogene brown RS yellow shade	I			
Pyrogene brown DIB	I			
Pyrogene catechine 2GO	I	1,102		Do.
Pyrogene cutch 2G	Q	500		Do.
Pyrogene cutch brown		440		Do.
Pyrogene cutch brown 2R extra	Q			
Pyrogene cutch brown 2R extra conc.	Q			
Pyrogene violet brown X	I	2,205		Do.
Pyrogene yellow brown RS	I	220		Do.
Sulphon catechine R	Q	141		Holland, 100 per cent.
Thiogene brown GR	M	441		Germany, 100 per cent
Thiogene orange R	M	172		Italy, 100 per cent.
Thional brilliant blue		1,884		Switzerland, 100 per c
Thional brilliant blue 6B	S			
Thional brilliant blue 6B conc	I			
Thional brilliant blue 6B	I			
Thional orange G	S	2,002		Do.
Thional yellow G	S	17,704		Do.
Thionine green GG	Q	9,797		England, 100 per cent
Thionol brilliant green 4GX	BD	6,720		Do.
Thionol brown		20,632	9,927	Do.
Thionol brown GD	BD			
Thionol brown P	BD			
Thionol brown R	BD			
Thionol corinth RBX	BD	2,240		Do.
Thionol green DY	BD	16,600		Do.
Thionol yellow		35,240		Do.
Thionol yellow GR	BD			
Thionol yellow 3RD	BD			
Thionone black 6R	BD	10		Do.

UNIDENTIFIED BASIC DYES.

Artificial silk black		1,422		Switzerland, 85 per
Artificial silk black	I			Italy, 15 per cent.
Artificial silk black KG conc	Q			
Brilliant cresyl blue 2BS, 200 per cent	L	55		Germany, 100 per cent
Cotton blue BC	K	100		Do.
Homophosphine red	Q	4		France, 100 per cent.
Isamine blue 6BX	C	1,008		Germany, 100 per cent
New ethyl blue B	M	100		Do.
Rosazeine	C	139		Do.

LE 24.—*Imports of dyes during the calendar year 1921*—Continued.

NIDENTIFIED SPIRIT SOLUBLE AND COLOR LAKE DYES.

ame of dye.	Manufacturer.	Imports.		Countries of origin (percentage of quantity).
		Quantity.	Invoice value.	
		Pounds.		
211 powder	B	5		Germany, 100 per cent.
		180		Do.
S	B			
	Q	99		Do.
B	Q	220		Do.
		440		Switzerland, 100 per cent.
LG	G			
R 8186	G			
powder	M	459		Germany, 100 per cent.
		2,315	$297	Do.
w 5G lumps	M			
w R paste	M			
w R paste 1918	M			
		1,343	1,526	Do.
aux BL powder	By			
aux BL 1763	By			
aux BL 20-100 paste 10837	By			
		743	1,461	Do.
olet AL	By			
olet AL 1360	By			
olet AL 10896a	By			
do	Q	251		France, 100 per cent.
		1,102		Germany, 100 per cent.
4228	Q			
42281 powder	Q			
t B paste	B	152		Do.
ge R		900		Do.
range R powder	B			
range R paste	B			
	B	5		Do.
3B conc	M	600		Do.
2B paste	M	1,113		Do.
	Q	230		Do.
	A	5		Do.

UNIDENTIFIED, UNCLASSIFIED, SPECIAL DYES.

	Q	861		France, 90 per cent; Germany, 10 per cent.
paste sand free	B	800		Germany, 100 per cent.
	By	324		Do.
	Q	2,756		France, 100 per cent.
black B powder	Q	311		Germany, 100 per cent.
leather black extra	M	716		Do.
aundry	B	50		Do.
	Q	100		Holland, 100 per cent.
		220		Germany, 100 per cent.
	B			
	B			
	M	20		Do.
S powder	Q	207		England, 100 per cent.
G	S	351		Switzerland, 100 per cent.
		1,761		Germany, 100 per cent.
BZ 90-100	C			
X	Q			
0526	By	40		Do.
	Q	112		England, 100 per cent.
dye	Q	500		Do.
aux B	By	300		Germany, 100 per cent.
	Q	2,753		Do.
	Q	447		Italy, 100 per cent.
	Q	11		France, 100 per cent.
inal	Q	110		Switzerland, 100 per cent.
der	By	82		Germany, 100 per cent.
		110		Do.
2GA	A			
	Q	755		Do.

TABLE 24.—*Imports of dyes during the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED.

Name of dye.	Schultz No.	Page.
Acetyl red BBX		118
Acetyl red GX		118
Acid alizarin black ENT		122
Acid alizarin black ET		122
Acid alizarin black R	159	93
Acid alizarin black SET		122
Acid alizarin black SN		122
Acid alizarin blue BB	790	108
Acid alizarin blue GR	790	108
Acid alizarin brown B		122
Acid alizarin brown RR		122
Acid alizarin gray G		122
Acid alizarin gray S		122
Acid alizarin green B	796	108
Acid alizarin green 2B		122
Acid alizarin green 3G	796	108
Acid anthracene brown R	88	92
Acid anthracene brown RH	88	92
Acid anthracene brown RR	88	92
Acid anthracene brown WSG	88	92
Acid anthracene red	400	97
Acid anthracene red 3B	400	97
Acid anthracene red 2BL	400	97
Acid anthracene red G	400	97
Acid black	269	94
Acid blue A		118
Acid blue B	565	101
Acid blue RBF		118
Acid brown	212	93
Acid brown D		118
Acid brown RN	212	93
Acid cyanine BF	705	104
Acid eosine L, new	590	102
Acid green	505	98
Acid green B	502	98
Acid magenta N		118
Acid milling black B		118
Acid milling red G	293	95
Acid milling red R		118
Acid ponceau E		118
Acid pure blue R		118
Acid red B		118
Acid red 2B		118
Acid red 4B		118
Acid red SDG		118
Acid red brown		118
Acid rhodamine BG		118
Acid rhodamine R		118
Acid rhodamine 3R		118
Acid violet 4BN	527	99
Acid violet 4BNS	527	99
Acid violet BW	527	99
Acid violet 6B	530	99
Acid violet 6BN	548	100
Acid violet 6BNOO	530	99
Acid violet 6BSX		118
Acid violet 7B (K)	530	99
Acid violet 7B (Q)		118
Acid violet 7B (B)	534	99
Acridine orange	603	102
Acridine red	569	101
Agalma black 10B	217	93
Agalma black 10BX	217	93
Algol blue C		121
Algol blue 3G	844	111
Algol blue K	839	111
Algol blue 3R	821	109
Algol blue 3RP	821	109
Algol brilliant orange FR	822	110
Algol brilliant red 2B	819	109
Algol brilliant violet 2B	821	109
Algol brilliant violet R	820	110
Algol brown B	869	115
Algol brown G		121
Algol brown R	869	115
Algol corinth R	870	115
Algol gray B	834	110
Algol green B	847	111
Algol olive R	833	114
Algol orange R	824	
Algol pink R	818	
Algol red B	825	
Algol red F	819	
Algol red FF	819	
Algol red 5G	816	
Algol red R	819	
Algol yellow 3G	811	
Algol yellow R	817	
Algol yellow S		
Alizarin GD	784	
Alizarin GD II	784	
Alizarin GG	785	
Alizarin GI	785	
Alizarin RG	785	
Alizarin YCA	785	
Alizarin SX	784	
Alizarin astrol	856	
Alizarin astrol B	856	
Alizarin astrol 3G	856	
Alizarin astrol GW	856	
Alizarin astrol R	856	
Alizarin black B	774	
Alizarin black S	774	
Alizarin black SF		
Alizarin black SP		
Alizarin black SWR	774	
Alizarin black WR	774	
Alizarin black WX	774	
Alizarin blue A	803	
Alizarin blue JR	803	
Alizarin blue S	804	
Alizarin blue SAP	804	
Alizarin blue SAWSA	804	
Alizarin blue SB	804	
Alizarin blue SR	804	
Alizarin blue SRW	804	
Alizarin blue SW	804	
Alizarin blue WX	803	
Alizarin blue		
Alizarin blue F		
Alizarin blue RR		
Alizarin blue SBW		
Alizarin blue SCB		
Alizarin blue SW		
Alizarin blue WC		
Alizarin blue WNN		
Alizarin blue black B	862	
Alizarin blue black BB		
Alizarin blue black BT	862	
Alizarin blue black 3B	862	
Alizarin blue black GT	774	
Alizarin blue soluble		
Alizarin Bordeaux B	787	
Alizarin brown	782	
Alizarin brown F	782	
Alizarin brown H	782	
Alizarin brown N	782	
Alizarin brilliant green KG		
Alizarin claret R	797	
Alizarin cyanine	788	
Alizarin cyanine G	799	
Alizarin cyanine GG	799	
Alizarin cyanine R	788	
Alizarin cyanine RR	799	
Alizarin cyanine WRB	788	
Alizarin cyanine green CG	865	
Alizarin cyanine green E	865	
Alizarin cyanine green EPP		
Alizarin cyanine green G	865	
Alizarin cyanole B	851	
Alizarin cyanole EF		
Alizarin cyanole SR		
Alizarin dark blue S	804	
Alizarin dark blue WW		
Alizarin delphinol BS		
Alizarin direct blue E 3B	851	
Alizarin direct green G	865	
Alizarin direct green 5G	865	
Alizarin direct violet	852	

TABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

Name of dye.	Schultz No.	Page.
Chlorantine fast blue 2GL		125
Chlorantine fast Bordeaux 2BL		126
Chlorantine fast brown 2GL		126
Chlorantine fast brown RL		126
Chlorantine fast orange TRL		126
Chlorantine fast red 7BL		126
Chlorantine fast rubine RL		126
Chlorantine fast violet BL		126
Chlorantine fast violet 4BL		126
Chlorantine fast violet 2RL		126
Chlorantine fast yellow 4GL		126
Chlorantine fast yellow RL		126
Chlorantine light blue 2GL		126
Chlorantine light yellow 4GL		126
Chlorantine orange TRL		126
Chlorazol brown G		126
Chlorazol brown GM		126
Chlorazol brown RD		126
Chlorazol fast red K		126
Chlorazol violet R		126
Chromacetin blue S		123
Chromal blue GC (for printing)		123
Chromanile black BF		126
Chromanile black 2F		126
Chromazurine G		123
Chrome azurol	554	100
Chrome azurol SXT	554	100
Chrome black AGZZ		123
Chrome black B		123
Chrome blue S		123
Chrome Bordeaux B		123
Chrome brown 17675		123
Chrome brown RR	158	93
Chrome brown RVV	158	93
Chrome cyanine G		123
Chrome fast blue 2R		123
Chrome fast blue BX		123
Chrome fast brown		123
Chrome fast brown TV		123
Chrome fast green G1		123
Chrome fast violet B		123
Chrome fast pure blue B	551	100
Chrome olive JCSB		123
Chromochlorine G		123
Chromochloruline B		123
Chromochloruline 6G		123
Chromosafranine B		123
Chromoxamine violet B, 5B		123
Chrysamine	342	96
Chrysamine K	342	96
Chrysophenine	304	95
Cibs blue BB	881	115
Cibs blue 2BD	881	115
Cibs blue G	882	116
Cibs Bordeaux B	919	117
Cibs gray B	899	116
Cibs gray G	899	116
Cibs green G	891	116
Cibs heliotrope B	897	116
Cibs red G	906	116
Cibs red R	908	117
Cibs rose BG		121
Cibs scarlet G	907	116
Cibs violet B	901	116
Cibs violet R	901	116
Cibanone black B	794	108
Cibanone blue 3G	793	108
Cibanone brown B	868	115
Cibanone brown V	868	115
Cibanone green B	792	108
Cibanone green G	792	108
Cibanone olive B	792	108
Cibanone orange R	792	108
Cibanone yellow R	795	108
Citronine O		119
Citronine OOO		119
Cloth fast blue B	693	104
Cloth fast blue BB		119
Cloth fast blue GTB		119
Cloth fast blue R		119
Cloth fast green G		119
Cloth fast orange G		119
Cloth fast red GR		119
Coerulein H		123
Coerulein S	601	102
Coerulein SS	601	102
Columbia black	436	97
Columbia black FF	436	97
Columbia Bordeaux B		126
Columbia fast scarlet 4B		126
Columbia violet R		126
Congo brown	477	98
Congo fast blue B	456	97
Congo fast blue R	451	97
Congo orange G	315	95
Congo orange R	373	97
Coomassie fast black B		119
Coomassie navy blue	257	94
Coomassie violet R		119
Copper blue B		126
Coreine RR	641	103
Corioflavine GOOO	609	103
Coriphosphine OX	606	102
Cotton blue	649	103
Cotton blue BC		130
Cotton brown W		126
Cotton fast red 4BSP	363	96
Cotton scarlet	227	94
Cotton yellow	296	95
Cotton yellow GI	296	95
Cotton yellow GX	296	95
Croceine orange X	37	91
Cross dye green		130
Cross dye green B		130
Cross dye green 2G		130
Cross dye yellow Y		130
Crystal ponceau	113	92
Crystal ponceau 6R	113	92
Crystal ponceau 6RW		119
Crystal scarlet 6R		119
Crystal violet	516	99
Cupranil brown G		126
Cupranil brown R		126
Curcumein	140	92
Curcuphenine	16	91
Cutch brown RR		126
Cyanine B	544	100
Cyananthrol	860	113
Cyananthrol BGA	860	113
Cyananthrol BGAO	860	113
Cyananthrol BGAOO	860	113
Cyananthrol G	860	113
Cyananthrol R	859	113
Cyananthrol RBX	859	113
Cyananthrol RX	859	113
Cyananthrol RXO	859	113
Cyanole	546	100
Cyanole ABC	546	100
Cyanole BSB	546	100
Cyanole FF	546	100
Cyanole extra H	546	100
Cyanole MKH	546	100
Cyanole fast green G	566	101
Cyanole green KBC	566	101
Dark eosine 6R		119
Delphine blue	622	103
Delphine blue B	622	103
Delta purpurine 5B	366	96
Diamine azo blue R		126
Diamine azo orange RR		126
Diamine azo scarlet 8B		126
Diamine azo scarlet A		126
Diamine azo scarlet 4BL		126
Diamine azo scarlet 6BL		126
Diamine azo scarlet BBL		126
Diamine black RMW	333	96
Diamine Bordeaux S		126
Diamine brilliant blue G	418	97
Diamine brilliant Bordeaux R	319	95

TABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

Name of dye.	Schultz No.	Page.
Azo yellow I	141	93
Benzamine pure blue	426	97
Benzo azurine G	410	97
Benzo Bordeaux 6B		124
Benzo brilliant violet 2R		124
Benzo bronze E		124
Benzo chrome black blue B		124
Benzo chrome black pure blue B		124
Benzo chrome brown B		124
Benzo chrome brown G		124
Benzo chrome brown 5G		124
Benzo copper blue B		124
Benzo copper blue 2B		124
Benzo fast black		124
Benzo fast black L		124
Benzo fast black S		125
Benzo fast blue FFL		125
Benzo fast blue G		125
Benzo fast blue 2GL	456	97
Benzo fast blue 4GL	456	97
Benzo fast Bordeaux 6BL		125
Benzo fast brown GL		125
Benzo fast brown RL		125
Benzo fast heliotrope BL		125
Benzo fast heliotrope 4BL		125
Benzo fast heliotrope 2RL		125
Benzo fast orange 2RL		125
Benzo fast orange S		125
Benzo fast pink 2BL	297	95
Benzo fast red FC	343	96
Benzo fast red	332	96
Benzo fast red 8BL	332	96
Benzo fast red 9BL	332	96
Benzo fast red L	332	96
Benzo fast scarlet	279	95
Benzo fast scarlet 4BA	279	95
Benzo fast scarlet 4BS	279	95
Benzo fast scarlet 5BS	279	95
Benzo fast scarlet 7BS	279	95
Benzo fast scarlet 8BS	279	95
Benzo fast scarlet GS	279	95
Benzo fast yellow 4GL	296	95
Benzo fast yellow RL	296	95
Benzoform scarlet B		125
Benzo heliotrope		125
Benzo orange R	340	96
Benzopurpurine 4B	363	96
Benzo red 12B		125
Benzo rhoduline red		125
Benzo rhoduline red B		125
Benzo rhoduline red 3B		125
Benzo violet	326	96
Benzo violet O	326	96
Benzo violet R	326	96
Benzyl green B	503	98
Benzyl violet 5BN	517	99
Biebrich patent black 4AN		119
Bismark brown	283	95
Bismark brown GG	283	95
Bistre T		131
Black base S		131
Blue FS		119
Blue black solid O	269	94
Brilliant acid blue	545	100
Brilliant acid blue A	545	100
Brilliant acid blue FF	545	100
Brilliant acid blue V	543	100
Brilliant acid green 6B	503	98
Brilliant alizarin blue R	667	104
Brilliant alizarin cyanine 3G		123
Brilliant anthrazurol G		119
Brilliant benzo blue 6B	424	97
Brilliant benzo green B		125
Brilliant benzo violet B		125
Brilliant benzo violet 2R		125
Brilliant black	272	94
Brilliant black blue R		119
Brilliant bronze black B		131
Brilliant carmine L		119
Brilliant chrome blue G		123
Brilliant chrome leather black		
Brilliant cochineal 4R	81	
Brilliant congo G	316	
Brilliant congo R	370	
Brilliant copper blue GW		
Brilliant cresyl blue 2BS		
Brilliant croceine 3B	227	
Brilliant croceine 3BA	227	
Brilliant croceine 9B	270	
Brilliant croceine M	227	
Brilliant delphine blue B	622	
Brilliant delphine blue BS	622	
Brilliant dianil blue 6G	541	
Brilliant fast blue B		
Brilliant fast blue 2G		
Brilliant fast blue 3BX		
Brilliant fast blue 3X		
Brilliant geranine G	118	
Brilliant green	499	
Brilliant indigo B, BB	885	
Brilliant indigo BD	885	
Brilliant lake BB		
Brilliant lake red R	45	
Brilliant lanafuchsine BB		
Brilliant lanafuchsine SL		
Brilliant milling blue B		
Brilliant milling blue R		
Brilliant milling red		
Brilliant milling red G		
Brilliant milling red R		
Brilliant naphthol blue R		
Brilliant phosphine 5G	606	
Brilliant pure yellow 6G		
Brilliant purpurine 4B	368	
Brilliant purpurine 10B	368	
Brilliant scarlet		
Brilliant scarlet FB		
Brilliant scarlet G		
Brilliant scarlet 3R		
Brilliant scarlet 4R		
Brilliant sky blue 5G	541	
Brilliant sky blue 8G		
Brilliant sky blue 2RN		
Brilliant sulphon red	182	
Brilliant sulphon red B	182	
Brilliant sulphon red 10B	182	
Bromofluoresceine acid crystals	587	
Bromofluoresceine A 3G	587	
Bromofluoresceine BL	587	
Bronze blue for laundry		
Bronze lake		
Bronze red L		
Capri blue GON	620	
Carbide black E	462	
Carthamine B	573	
Cerasine red B	223	
Cerise acid		
Celestine blue B	641	
Chicago blue 6B	424	
Chicago blue R	388	
Chicago red III		
Chloramine G	475	
Chloramine black	469	
Chloramine black BH conc. double	333	
Chloramine blue 3G	471	
Chloramine brilliant red		
Chloramine brilliant red 8B		
Chloramine fast red F	343	
Chloramine red B	319	
Chloramine red 3B	319	
Chloramine red 8BS		
Chloramine sky blue A	426	
Chloramine sky blue BB X FF	424	
Chloramine sky blue FF	424	
Chloramine violet FFB		
Chloramine yellow G	617	
Chloranthrene Bordeaux		
Chloranthrene red 5GY		
Chlorantine fast black B		

TABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

ıme of dye.	Schultz No.	Page.
fast blue 2GL		125
fast Bordeaux 2BL		126
fast brown 2GL		126
fast brown RL		126
fast orange TRL		126
fast red 7BL		126
fast rubine RL		126
fast violet BL		126
fast violet 4BL		126
fast violet 2RL		126
fast yellow 4GL		126
fast yellow RL		126
light blue 2GL		126
light yellow 4GL		126
orange TRL		126
own G		126
own GM		126
own RD		126
st red K		126
olet R		126
ı blue S		123
ıe GC (for printing)		123
black BF		126
black 2F		126
ne G		123
rol	554	100
rol SXT	554	100
ck AGZZ		123
ck B		123
e S		123
deaux B		123
wn 17675		123
wn RR	158	93
wn RVV	158	93
nine G		123
blue 2R		123
blue BX		123
brown		123
brown TV		123
green GL		123
violet B		123
pure blue B	551	100
e JCSB		123
rine G		123
lufine B		123
lufine 6G		123
anine B		123
line violet B, 5B		123
	342	96
K	342	96
ine	304	95
B	881	115
3D	881	115
	882	116
ux B	919	117
	899	116
	899	116
J	891	116
ope B	897	116
	906	116
	908	117
G		121
G	907	116
B	901	116
R	901	116
ack B	794	108
ue 3G	793	108
own B	868	115
own V	868	115
een B	792	108
een G	792	108
ive B	792	108
ange R	792	108
llow R	795	108
		119
OO		119
ue B	693	104
ue BB		119
ue GTB		119
ue R		119

Name of dye.	Schultz No.	Page.
Cloth fast green G		119
Cloth fast orange G		119
Cloth fast red GR		119
Coerulein H		123
Coerulein S	601	102
Coerulein SS	601	102
Columbia black	436	97
Columbia black FF	436	97
Columbia Bordeaux B		126
Columbia fast scarlet 4B		126
Columbia violet R		126
Congo brown	477	98
Congo fast blue B	456	97
Congo fast blue R	451	97
Congo orange G	315	95
Congo orange R	373	97
Coomassie fast black B		119
Coomassie navy blue	257	94
Coomassie violet R		119
Copper blue B		126
Coreine RR	641	103
Corioflavine GOOO	609	103
Coriphosphine OX	606	102
Cotton blue	649	103
Cotton blue BC		130
Cotton brown W		126
Cotton fast red 4BSP	303	96
Cotton scarlet	227	94
Cotton yellow	296	95
Cotton yellow GI	296	95
Cotton yellow GX	296	95
Croceine orange X	37	91
Cross dye green		130
Cross dye green B		130
Cross dye green 2G		130
Cross dye yellow Y		133
Crystal ponceau	113	92
Crystal ponceau 6R	113	92
Crystal ponceau 6RW		119
Crystal scarlet 6R		119
Crystal violet	516	99
Cupranil brown G		126
Cupranil brown R		126
Curcumein	140	92
Curcuphenine	16	91
Cutch brown RR		126
Cyanine B	544	100
Cyananthrol	860	113
Cyananthrol BGA	860	113
Cyananthrol BGAO	860	113
Cyananthrol BGAOO	860	113
Cyananthrol G	860	113
Cyananthrol R	859	113
Cyananthrol RBX	859	113
Cyananthrol RX	859	113
Cyananthrol RXO	859	113
Cyanole	546	100
Cyanole ABC	546	100
Cyanole BSB	546	100
Cyanole FF	546	100
Cyanole extra H	546	100
Cyanole MKH	546	100
Cyanole fast green G	566	101
Cyanole green KBC	566	101
Dark eosine 6R		119
Delphine blue	622	103
Delphine blue B	622	103
Delta purpurine 5B	366	96
Diamine azo blue R		126
Diamine azo orange RR		126
Diamine azo scarlet 8B		126
Diamine azo scarlet A		126
Diamine azo scarlet 4BL		126
Diamine azo scarlet 6BL		126
Diamine azo scarlet BBL		126
Diamine black RMW	333	96
Diamine Bordeaux S		126
Diamine brilliant blue G	418	97
Diamine brilliant Bordeaux R	319	95

TABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

Name of dye.	Schultz No.	Page.	Name of dye.	Schultz No.	Pa
Helio fast blue SL	858	113	Indigo KG	883	
Helio fast red RL	73	92	Indigo LL		
Helio fast violet AL		131	Indigo LL 2 R		
Helio violet solid		131	Indigo MLB 6 B	883	
Homophosphine OO	609	103	Indigo blue 2 BZ		
Homophosphine red		130	Indigo blue X		
Hydrazol orange G		131	Indigo carmine	877	
Hydrazine yellow		120	Indochromine RR	667	
Hydron blue B	748	105	Indochromine T	667	
Hydron blue G	748	105	Indocyanine B	705	
Hydron blue R	748	105	Indoine blue R	126	
Hydron blue RF	748	105	Indoine blue BB	126	
Hydron olive B	748	105	Ink blue BITBNOO		
Hydron olive G	748	105	Isamine blue 6 BX		
Hydron violet B	748	105	Janus black		
Immedial direct blue B		130	Janus red B	240	
Immedial indogene B		130	Janus yellow G	222	
Immedial indogene AGG		130	Jasemine	140	
Immedial orange C	711	105	Katigene black brown GN	706	
Immedial yellow D	710	104	Katigene bronze GL		
Indamine 6R	705	104	Katigene direct blue B		
Indanthrene blue GC	843	111	Katigene direct blue RF		
Indanthrene blue GCD	842	111	Katigene green 2 G	746	
Indanthrene blue GGS	841	111	Katigene yellow brown RL		
Indanthrene blue GGSNP	841	111	Katigene yellow brown 3 RL		
Indanthrene blue GGSP	841	111	Katigene yellow GR		
Indanthrene blue GGSZ	841	111	Kiton fast green V	564	
Indanthrene blue 3G	840	111	Kiton fast orange G		
Indanthrene blue 3GP	840	111	Kiton fast red R		
Indanthrene blue RS	838	110	Kiton fast violet 10 B	528	
Indanthrene blue RSP	838	110	Kiton fast yellow		
Indanthrene blue WB	850	112	Kiton fast yellow 3 G		
Indanthrene blue WBO	850	112	Kiton pure blue V	543	
Indanthrene blue G 2Z		121	Kiton red 6 B		
Indanthrene blue RC		121	Kiton red G		
Indanthrene blue RZ		121	Kiton red S		
Indanthrene Bordeaux B	827	110	Kiton yellow 3 G		
Indanthrene brown B	867	110	Kiton yellow S		
Indanthrene brown 3R		121	Lake blue		
Indanthrene brown RR		121	Lake red P	132	
Indanthrene claret B	827	110	Lanafuchsine SG	64	
Indanthrene dark blue BO	763	106	Lanafuchsine BBS	64	
Indanthrene golden orange G	760	105	Lanasol brown 2 R		
Indanthrene golden orange R	761	105	Lanasol green G		
Indanthrene golden orange RN		122	Lanasol orange G		
Indanthrene golden orange RRT	761	105	Lanasol orange 2 R		
Indanthrene golden orange 3R		122	Lanasol red G		
Indanthrene gray	848	111	Lanasol violet B		
Indanthrene gray B	848	111	Lanasol violet R		
Indanthrene gray BP	848	111	Lanasol yellow G		
Indanthrene green B	765	106	Light green yellowish SFXX	505	
Indanthrene olive G	791	108	Light yellow G		
Indanthrene orange RT	812	109	Lithol Bordeaux B		
Indanthrene pink B	873	115	Lithol fast orange R		
Indanthrene pink BS	873	115	Lithol rubine BN	152	
Indanthrene red BN	831	110	Magenta	512	
Indanthrene red R	830	110	Malachite green	495	
Indanthrene red violet RRN	873	115	Malachite green small crystals	495	
Indanthrene red violet RRNP	873	115	Manila brown		
Indanthrene scarlet G	762	105	Meldola's blue 3 R, conc	649	
Indanthrene scarlet GS	762	105	Metachrome blue black 2 BX		
Indanthrene violet B	768	106	Metachrome blue black R		
Indanthrene violet BB	768	103	Metachrome Bordeaux B	92	
Indanthrene violet BN		122	Metachrome Bordeaux R	92	
Indanthrene violet R	766	106	Metanil yellow	134	
Indanthrene violet RN	832	110	Metaphenylene blue R	690	
Indanthrene violet RR	767	106	Methyl alkali blue	535	
Indanthrene violet RRX	767	106	Methyl blue for silk	537	
Indanthrene violet RT	764	106	Methyl Lyons blue	537	
Indanthrene yellow G	849	111	Methyl silk blue (new)	537	
Indanthrene yellow GN	849	111	Methyl violet	515	
Indanthrene yellow GP	849	111	Methyl violet NFB	515	
Indanthrene yellow GT	849	112	Methyl violet V3D	515	
Indanthrene yellow R	849	112	Methylene blue	659	
Indazine M	689	104	Methylene blue BBS	659	
Indigine blue RW		129	Methylene blue BG	659	
Indigo synthetic	874	115	Methylene green BX	660	
Indigo 6 B	883	116	Methylene green P	660	
Indigo KB	881	116	Methylene green W	660	

ABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

ne of dye.	Schultz No:	Page.
liotrope	687	104
llow H	618	103
3C	693	104	
	293	95
3A		120
r GA		120
r OC		120
r OM	177	93
r R		120
	198	93
	629	103
	635	103
brown E		124
black B, T	275	94
yellow E		124
ow	177	93
e brown		124
e brown G		124
black AB		120
blue B		120
green	564	101
green V	564	101
green NV		120
black	335	96
black AB		129
black CE	335	96
black CET	335	96
blue	338	96
blue 3R	338	96
blue 7R	338	96
brown H	477	98
direct black AK	458	97
direct black EK	458	97
direct black ERK		
	458	97
direct black GNM	458	97
direct black FFK		
	458	97
direct black		
	458	98
direct black		
A	458	98
direct blue 2R		129
fast black SF		129
fast black KSG		129
fast brown BL		129
violet BE	326	96
yellow BN	9	91
yellow G	9	91
blue B		129
blue 2R		129
blue 4R		129
ndigo blue R		129
pure blue 4B		129
ck BD	272	94
ck P	272	94
e black	217	93
e black S	217	93
k green G		120
n B	4	91
EB	168	93
low S	7	91
e black N	268	94
ne black	266	94
ne black 4B	266	94
ne black 4BS	266	94
ne black 4BX	266	94
ne black ESN	266	94
ne black S	266	94
	126	92
BB	126	92
		120
BXX	545	100
BGX	543	100
n SBLX	503	98
n SGX	503	98
		120
B		120
BS		120
2BN		120

Name of dye.	Schultz No.	Page.
New blue RS	649	103
New ethyl blue B		130
New fast gray	681	103
New methylene blue GG	651	103
New methylene blue N	663	104
New patent blue B	563	101
Night blue	560	101
Neutral blue R	676	104
Neutral cloth blue R		120
Neutral gray G	241	94
Nigrophor	218	94
Nigrosine (soluble in water)	700	104
Nile blue	653	103
Nile blue BX	653	103
Nile blue 2B	654	103
Oil yellow R		131
Old gold aniline dye		131
Omega chrome black P	85	92
Omega chrome brown P		124
Omega chrome brown PB		124
Omega chrome red B		124
Orange G	38	91
Orange GG	38	91
Orange 3RL		120
Orange IV	139	92
Ortho cyanine B		120
Oxamine black BB		129
Oxamine brilliant violet RX		129
Oxamine chrome violet SB		129
Oxamine fast blue BX		129
Oxamine fast pink BNE		129
Oxamine fast pink BX		129
Oxamine green C	475	98
Oxamine light blue B		129
Oxamine light blue G		129
Oxamine light brown R		129
Oxamine red	346	96
Oxamine red X	346	96
Oxamine violet	326	96
Oxy acid blue 6B		120
Oxy acid red BB		120
Oxy acid violet ROO		120
Oxy chrome black F VOOO		124
Oxy chrome blue black 6BNOO		124
Oxy diamine black 5000		129
Oxy diamine black N		129
Oxy diamine brown RN		129
Oxy diamine red S		129
Oxy diamine violet	326	96
Oxy diaminogene ED		129
Oxyphenine GG	617	103
Oxyphenine R	617	103
Palatine black	220	94
Palatine chrome brown	154	93
Palatine chrome brown RX	154	93
Palatine light yellow RX		120
Paper fast Bordeaux B		131
Paraphosphine G	606	102
Parasulfon brown G		129
Patent black I		120
Patent black II		120
Patent black N		120
Patent blue A	545	100
Patent blue B	543	100
Patent blue J4	543	100
Patent blue N	543	100
Patent blue V	543	100
Patent blue VE	543	100
Patent blue VF	543	100
Patent blue VSK	543	100
Patent dianil black EB		129
Patent marine blue LE	543	100
Patent phosphine G	606	102
Patent phosphine 5G	606	102
Patent phosphine GG	606	102
Patent phosphine R	606	102
Patent phosphine M	606	102
Peri wool blue B	87	92
Permanent red	152	93
Permanent red 4B	152	93

TABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

Name of dye.	Schultz No.	Page.
Permanent red R	152	93
Phenocyanine VS paste	642	103
Phosphine	606	102
Phosphine G	606	102
Phosphine 7G	606	102
Phosphine PGG	606	102
Phosphine R	606	102
Phosphine 3R	606	102
Pigment purple A	93	92
Pigment red B	56	91
Pigment red G	56	91
Pigment scarlet 3B		131
Pigment violet 2B		131
Pink SBS		131
Pluto black CF		129
Pluto black G		129
Polar red G		120
Polychromine AC	616	103
Polyphenyl blue GC		129
Polyphenyl yellow RC		129
Ponceau R	82	92
Ponceau 4R	83	92
Ponceau X	83	92
Potting black B		124
Printers red		131
Prune	636	103
Prune pure	636	103
Pure blue for printing		120
Pyramine G		129
Pyramine orange 3G	306	95
Pyramine orange 3GX	306	95
Pyramine orange R	360	96
Pyrazol orange G		129
Pyrogene blue	726	105
Pyrogene brown RS (yellow shade)		130
Pyrogene brown DIB		130
Pyrogene catechine 2GO		130
Pyrogene cutch 2G		130
Pyrogene cutch brown 2R		130
Pyrogene direct blue RL	726	105
Pyrogene green 2G	709	104
Pyrogene green 3G	709	104
Pyrogene indigo I	735	105
Pyrogene olive 3G	746	105
Pyrogene violet brown X		130
Pyrogene yellow	734	105
Pyrogene yellow M	734	105
Pyrogene yellow O	734	105
Pyrogene yellow brown RS		130
Quinoline yellow	613	103
Quinoline yellow KT	613	103
Quinoline yellow N	613	103
Quinoline yellow KT extra	613	103
Quinoline yellow O	613	103
Quinoline yellow OK	613	103
Resoflavine	771	106
Resorcine brown	211	93
Resorcine brown F	211	93
Rheonine GD	607	102
Rheonine AL	607	102
Rhodamine B	573	101
Rhodamine G	572	101
Rhodamine 6G	571	101
Rhodamine 6GD	571	101
Rhodamine 6GDN	571	101
Rhodamine 6GDW	571	101
Rhodamine S	570	101
Rhodamine ponceau G		120
Rhoduline orange NO	603	103
Rhoduline yellow 6G	618	103
Roccelline scarlet		120
Rosanthrene B		129
Rosanthrene R		129
Rosanthrene Bordeaux B		129
Rosanthrene orange R		129
Rosanthrene pink		129
Rosazeine		
Rose aurore		
Rose bengale NTO	595	
Rosinduline 2B	673	
Rosolane	688	
Rosolane O	687	
Rosolane OTR	687	
Saba phosphine 2G	606	
Saba phosphine M	606	
Safranine FF	679	
Salicine black C	181	
Salicine black D	181	
Salicine black U	181	
Salicine black UL	181	
Salicine blue B		
Salicine blue black AE		
Salicine Bordeaux RF		
Salicine brown RE		
Salicine dark green CS		
Salicine orange 2R		
Salicine red B		
Salicine violet R		
Salicine yellow L	177	
Scarlet	247	
Scarlet MS	247	
Scarlet red medicinal		
Setoflavine T		
Setoglaucine	496	
Silk blue	539	
Silk blue BT 5BOO	539	
Silk blue IV	537	
Silk scarlet		
Silver gray P	700	
Sky blue B		
Solamine blue FF		
Solid green	495	
Soluble blue IN, T	539	
Special blue G		
Sudan III	223	
Sudan R	93	
Sudan 4GL		
Sulphoncyanine	257	
Sulphoncyanine GR	257	
Sulphoncyanine black	265	
Sulphon orange G		
Sulphon yellow R		
Sulphon yellow 5G		
Sulphur catechine R		
Supramine black BR		
Supramine yellow R		
Tartrazine	23	
Tartrazine N	23	
Tartrazine XX	23	
Tartrazine brown	23	
Tetra cyanole	543	
Tetra cyanole V	543	
Thiazol yellow	198	
Thiazol yellow G	198	
Thioflavine T	618	
Thioflavine TCN	618	
Thiogene brown GR		
Thiogene orange R		
Thio indigo black B		
Thio indigo orange R	913	
Thio indigo pink AN	910	
Thio indigo pink RN		
Thio indigo red B	912	
Thio indigo rose AN	910	
Thio indigo rose BN	910	
Thio indigo scarlet G	906	
Thio indigo scarlet 2G	906	
Thio indigo scarlet R	905	
Thio indigo violet 2R		
Thional brilliant blue 6B		
Thional brilliant green 2G	746	
Thional dark green GN	746	
Thional orange G		

TABLE 24.—*Imports of dyes for the calendar year 1921*—Continued.

INDEX OF DYES IMPORTED—Continued.

Name of dye.	Schultz No.	Page.
llow G		130
lue GO	661	104
reen GG		130
illiant green 4GX		130
own GD		130
own P		130
own R		130
rinth RBX		130
een DY		130
llow GR		130
llow 3RD		130
black 6R		130
t red 2BL		121
t red 6BL		121
fast orange GL	392	97
orange	392	97
red	358	96
k BGII	265	94
ue BOOO		129
n bronze B		129
n brown B	449	97
n brown MB	449	97
n brown GG	457	97
n violet B	322	96
n violet N		129
blue	498	98
blue BB	498	98
t MO	635	103
k M No. 8		129
e BDM 3		129
	923	117
	923	117
	923	117
	923	117
	923	117
	923	117
	923	117
	923	117
	923	117
	923	117
	923	117
n 2GA		131
G	923	117
R	923	117
N		122
ue B	559	100

Name of dye.	Schultz No.	Page.
Victoria blue R	558	100
Victoria blue 4R	522	99
Victoria green BXX	497	98
Victoria pure blue B	559	101
Victoria blue BO	559	101
Victoria scarlet K2Z		121
Victoria scarlet K3G		121
Victoria violet 4BS	61	91
Victoria violet 4BSL	61	91
Victoria yellow		121
Violamine B	580	101
Violet blue acid 7B		121
Violet for wool 8B		121
Viridine green		131
Water blue	539	99
Wool black 6B	220	94
Wool black GRF	220	94
Wool blue 5B	565	101
Wool blue G	565	101
Wool blue R	565	101
Wool blue RL 647		121
Wool fast blue BL		121
Wool fast blue GL		121
Wool fast marine blue BB		121
Wool fast yellow G		121
Wool fast yellow 5GX		121
Wool green BS	566	101
Wool green S	566	101
Wool green SC	566	101
Wool jet black 3B (old type)	220	94
Wool violet RLF		121
Xylene blue AS	508	98
Xylene blue ASL	508	98
Xylene blue VS	507	98
Xylene cyanol FF		121
Xylene fast green B		121
Xylene light yellow 2G	22	91
Xylene light yellow R	22	91
Xylene red B	579	101
Zambesi Bordeaux 7B		129
Zambesi brown	330	96
Zambesi brown 4R	330	96
Zambesi pure blue 4B	274	94
Zambesi red 4B		129
Zambesi scarlet 6B		129

PART IV.

CENSUS OF SYNTHETIC ORGANIC CHEMICALS, NOT OF COAL-TAR ORIGIN, 1921.

PART IV.

CENSUS OF SYNTHETIC ORGANIC CHEMICALS, OTHER THAN THOSE OF COAL-TAR ORIGIN, 1921.

INTRODUCTION.

Owing to the lack of previous information on the production of synthetic organic chemicals other than those of coal-tar origin, and because of its desirability for the use of Congress in connection with pending tariff legislation, the United States Tariff Commission has compiled a census of the production of this class of chemical compounds, showing the amount produced, the amount sold, and the value of the sales in all cases where the publication of these figures does not reveal the operations of the individual producer.

The products included in this census comprise those synthetic organic compounds derived from sources other than coal tar. They do not include aliphatic compounds derived from natural sources by isolation, distillation, extraction, hydrolysis, or purification, as for example alkaloids, constituents of essential oils, sugars, and acids, such as stearic and tartaric. Nor does the census include cyanides, cyanamides, or carbides of metals or inorganic radicals. Items the production statistics of which are obtainable from other sources are in most cases excluded.

The Bureau of the Census has given in its reports the statistics of the more important non coal-tar organic compounds. These the Tariff Commission has not attempted to duplicate in its 1921 census, except in a few instances where the importance of the industry, or other conditions warranted. A summary table of the 1914 and 1919 production of organic chemicals as determined by the Bureau of the Census is given. It is to be hoped that future enumerations may include all of these items, and also formic acid, mucic acid, and formaldehyde.

SUMMARY OF PRODUCTION.

The production of synthetic organic chemicals, other than those derived from coal tar, in 1921 was 21,545,186 pounds, while the sales amounted to 16,761,096 pounds, valued at $13,746,235, at a unit value of $0.82 per pound. In this production 1,129 pounds of research chemicals are included (see Table 26) and in the sales 428 pounds, which totaled $7,715, or $18.02 per pound. Exclusive of research chemicals, 226 different products are enumerated, manufactured by 66 concerns.

The absence of statistics for any previous years precludes accurate comparisons of production with that of 1921, save where Bureau of the Census figures are available.

Developments in the Industry.

Prior to the war there was practically no manufacture in the United States of synthetic organic chemicals other than those of coal-tar origin, with the exception of a few products produced in considerable amounts by relatively simple and inexpensive processes. These include acetone, chloroform, ether, acetic acid, formaldehyde, acetaldehyde, amyl acetate, vanillin, and a few others.

As with coal-tar products, the supremacy of Germany in nearly all other organic compounds was virtually unchallenged prior to the war. With the cessation of our imports from this source, production of these commodities was undertaken in this country, until to-day the United States is able to manufacture nearly all of its requirements of compounds of this nature.

Perfume chemicals.—Since the outbreak of the war there have been noteworthy developments in the manufacture of perfume ingredients, the most important of which are citral, geraniol, heliotropine, ionone, and terpineol. The manufacture of vanillin was already well established prior to the war. Many other perfume materials of lesser importance were also developed and produced. In some cases the domestic product is obtainable at less cost than the foreign, which commands a higher price when the odor is more acceptable to the consumer, although chemically the foreign product is practically identical with the American. The domestic manufacture of these perfume ingredients is now well established, about 24 firms being producers during 1921.

Esters.—The manufacture of esters was also well developed before 1914, notably in the case of amyl acetate, and ethyl acetate. The output of amyl acetate decreased from 1,300,000 pounds in 1914 to 704,600 pounds in 1919, and less than 200,000 pounds in 1921. The decrease is due chiefly to the development of substitute solvents for use in the pyroxylin plastic industry, but in 1921 the business depression was an important contributing factor in this reduced production.

The availability of tax-free denatured alcohol was instrumental in the development of the ethyl esters, chief among which are ethyl acetate and ethyl chloride. Specially denatured alcohol, used under heavy bond, aided in increasing the production of ethyl ether and chloroform, already well established prior to the war, although chloroform is now largely made at a lower cost from carbon tetrachloride or acetone. The production of both of these anaesthetics was greatly increased during the war. The production of ethyl esters, ether, carbon tetrachloride, and chloroform decreased from 1919 to 1921, these years very nearly representing conditions of maximum business prosperity and depression, respectively.

Another industry largely developed during and after the war was the manufacture of fruit ethers and esters, which was stimulated by the increased demand for soft drinks after prohibition became effective. Pre-war production figures for these products are not available, but they were not manufactured then to any considerable extent. They are produced from fusel oil and other alcohols, and certain organic acids.

Medicinals.—The manufacture of synthetic medicinals was practically nonexistent prior to the war. The cessation of imports resulted in the establishment of plants manufacturing a wide variety

of synthetic non coal-tar organic medicinals, notably chloral hydrate, barbital, codeine, diacetyl morphine or heroin, and salts of glycerophosphoric acid. Chloral hydrate was manufactured in the United States in different periods by two firms, but on account of severe foreign competition its manufacture was discontinued about 1913.

Butyl alcohol.—A few years ago, butyl alcohol was of scientific interest only. The large war demand for acetone led to the development of a process of fermenting corn which produced both acetone, ethyl alcohol, and butyl alcohol. A large plant was erected at Terre Haute, Ind., by the United States and British Governments, and following the war it was purchased by the Commercial Solvents Corporation, and reopened in March, 1920. The ability of this plant to operate in peace time was due to the development of the use of butyl alcohol as a solvent in pyroxylin plastics. The process is patented and controlled by the Commercial Solvents Corporation. The output in 1921 was in excess of 2,000,000 pounds of butyl alcohol, and nearly the same amount of acetone and denatured alcohol.

Acetylene derivatives.—A field of promising future development is the production of synthetic acetaldehyde and acetic acid, starting with calcium carbide as a base, oxidizing the acetylene derived therefrom, in the presence of a mercuric catalyst, and thus leading to the preparation of a large variety of aliphatic compounds. Among the most important of these are acetic anhydride, aldol, recently employed with success in the flotation process for concentrating copper ores, aldehyde ammonia for use as an accelerator in the vulcanization of rubber, butadiene, acetal for use as a solvent and in medicine, trichloroethylene, chloroacetic acid, and synthetic ethyl alcohol, the cheap production of which would be an exceedingly important contribution as a motor fuel to the diminishing resources of petroleum and gasoline.

The economic manufacture of acetaldehyde and glacial acetic acid by this method depends upon cheap calcium carbide, which, in turn, is dependent upon cheap electric power. Thus far the United States has been producing only a fraction of its requirements of acetaldehyde and its polymerized form, paraldehyde, obtaining these chiefly from Canada, where a plant was erected at Shawinigan Falls during the war to produce acetic acid and acetone from acetylene. Development work and production on a small scale by this process is now in progress in the United States.

Ethylene and propylene derivatives.—A prolific field for the development of ethylene and propylene derivatives, upon many of which commercial production has already been commenced by at least two concerns, based upon the recovery of ethylene and propylene from the waste gases of petroleum cracking processes and other hydrocarbon gases.

Of these derivatives, ethylene dichloride will probably be the first to assume commercial importance because of its value as a noninflammable nonhydrolizable volatile solvent for fats and greases. Ethylene chlorohydrin may also be used as a solvent and in further organic syntheses. Ethylene glycol can be used to replace glycerine. Other products from these sources include diethysulphate for ethylating, particularly in dye manufacturing, and isopropyl alcohol for solvent purposes and for syntheses of perfume ingredients and other uses.

Synthetic camphor has been produced in the United States as a partial substitute for natural Japanese camphor. It has been found profitable to manufacture the synthetic product only when the price of the natural was above a certain figure. During 1921 the only domestic synthetic camphor plant was shut down.

Mucic acid is one of the most recent of the rare organic chemicals to become available on a large commercial scale. It is produced by the hydrolysis and oxidation of mixtures of glucose and galactose obtained from the western larch (*Larix occidentalis*). Its chief use is as a baking acid in the self-rising flour industry and as a mordant and chrome assistant in textile dyeing. It may also compete with citric acid in the preparation of effervescent salts, soft drinks, etc. Production is not reported for 1921.

Other notable advances made during or since the war were in the production of gallic and pyrogallic acids for the dye and photographic trades and urea as a stabilizer in the pyroxylin plastic industry.

As in the production of coal-tar research chemicals, so with the production of other synthetic organic research chemicals which were produced only in the course of laboratory research if at all, much credit is due one concern for the organization of facilities, together with the necessary exhaustive research, to supply the complete shortage of these materials during the course of the war. It may be said that practically any compounds of this nature can now be produced in the United States if the demand arises.

Imports of most of the synthetic organic chemicals have been under license control. Importation was permitted if the domestic supplies were unsatisfactory either as to price, quality, or terms of delivery.

Import statistics of but few of these organic chemicals are available, and all are exceeded by domestic production, with the exception of cocaine, the basic material for which, namely, cocoa leaves, is not cultivated in the United States. Chemicals of which the domestic supply is inadequate and not separately given in the import statistics include certain perfumes and flavoring ingredients, medicinals, and research chemicals.

TABLE 25.—*Production and sales of synthetic organic chemicals during 1921.*

(Not derived from coal tar.)

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 156. An X signifies that the corresponding chemicals were made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there were sales of the corresponding chemicals in the United States during 1921, but that the figures can not be published without revealing information in regard to the sales of individual firms. The blank space in the sixth column indicates that there was actual production of the corresponding chemicals in the United States during 1921, but that the figures can not be published without revealing information in regard to the output of individual firms. The details thus concealed are, however, included in the totals.]

Name.	Manufacturers' identification number.	Sales, 1921.			Total production, 1921.
		Quantity.	Value.	Unit value.	
		Pounds.			*Pounds.*
Total		16,761,096	$13,746,235	$0.82	21,545,186
Acetaldehyde	17-27-42-X				36,671
Acetamide	15-16-48-54-61	367	1,330	3.62	441
Acetylene tetrabromide	13				
Acetylene tetrachloride	13				
Alcohols higher than butyl (mixed)	50				
Aldehyde ammonia	42				
Aldol (acetaldol)	X				

TABLE 25.—*Production and sales of synthetic organic chemicals during 1921*—Continued.

(Not derived from coal tar.)

Name.	Manufacturers' identification number.	Sales, 1921.			Total production, 1921.
		Quantity.	Value.	Unit value.	
		Pounds.			*Pounds.*
Allyl alcohol	40				
Allyl isosulfocyanate	40				
Ammonium valerate (valerianate)	52				
Amyl acetate	14-18				
Amyl butyrate	18				
Amyl caproate	X				
Amylene	54				
Anethol	57-X				
Anisepine (anisaldehyde)	7-19-57-X	2,298	$10,136	$4.41	2,358
Barbital	1				
Bromocamphor	30				
Bromodiethylacetic acid	6				
Bromodiethylacetylcarbamide	6				
Bromoform	30				
Butyl acetate	14-18				
n-Butyl acetate	5-29-58-X			.27	630,802
n-Butyl alcohol (butanol)	11				
Sec. butyl alcohol	50				
n-Butyl bromide	1-54				
n-Butyl n-butyrate	38				
n-Butyl carbonate	X				
n-Butyl iodide	54-X				
Butyl n-malonic ester	54				
n-Butyric acid	15-38-X				28,792
Calcium bimalate	61				
b-Calcium glycerophosphate	39-X				
Calcium monoiodobehenate	6				
d-Camphoric acid	16-30				
n-Caproic acid	15-17-38				
Carbon tetrachloride	13-22-60	4,396,004	449,709	10	
Chloral hydrate	33-36				
Chloroacetic acid (Mono)	13-36-X				
Chloroethyl acetate	13				
Chloroform	13-49				
Citronellol	17-57-X	475	4,850	10.21	
Citronellyl acetate	17-X				
Citronellyl butyrate	17				
Citronellyl formate	17				
Cocaine	30				
Codeine	30				
Cyanoacetic acid	6				
Decyl alcohol	17-20-57	13	780	6.00	16
Decyl aldehyde	17-20-57				38
Diacetylmorphine	30-33-37-45	699	78,169	11.83	622
Dichloroacetic acid	13				
Dichlorohydrin	6				
Diethylacetic acid	6				
Diethylamine	1-25-54				
Diethylaminoethanol	34				
b-Diethylaminoethyl alcohol	25				
Diethylbarbituric acid (veronal)	6-25				
Diethylsulfonedimethylmethane	30				
Diethylsulfonemethylethylmethane	30				
Dioxydihydroxypropane	6				
Dimethylglyoxime	3-16-24-28-48-54	208	4,802	23.09	221
Dioxytartaric acid	8				
Dinocinyl peroxide	51				
Ethyl acetate	5-14-18-20-29-30-35-38-X-X.	2,946,206	3,360,559	1.14	5,310,688
Ethyl acetoacetate	20-54-57-X				
Ethyl bromide	1-6-13-20-25-45-54-55-57.	61,108	25,793	.42	176,774
Ethyl butyrate	7-15-17-18-20-38-57-X-X.	43,561	60,295	1.38	42,144
Ethyl carbonate	17-X				
Ethyl caproate	X				
Ethyl chloride	18-21-47-X	99,649	45,868	.46	106,813
Ethyl chloroacetate	X				
Ethyl citrate	X				
Ethyl ether	12-14-30-45-49-X	2,981,507	4,338,333	1.46	3,025,041
Ethyl formate	17-20-38-57-X-X	3,000	2,320	.77	2,413
Ethyl fumarate	X				
Ethylglycolic acid ester of menthol	6				
Ethyl iodide	15-16-24-30-33-45-54-X.	227	1,417	6.24	216
Ethyl isovalerate	17-20-38-57-X-X	744	6,370	8.56	820
Ethyl lactate	X				
Ethyl laurate	17-20-54	61	714	11.71	76

TABLE 25.—*Production and sales of synthetic organic chemicals during 1921*—Continued.

(Not derived from coal tar.)

Name.	Manufacturers' identification number.	Sales, 1921.			Total production, 1921.
		Quantity.	Value.	Unit value.	
		Pounds.			*Pounds.*
Ethyl malate	X				
Ethyl maleate	X				
Ethyl malonate (mono and di)	1-6-57-X	317	$811	$2.56	56,305
Ethyl monochloroacetate	13				
Ethyl morphine	37				
Ethyl nitrite	18-30-45-54-X	44,544	26,529	.60	45,942
Ethyl tartrate	X				
Ethyl oenanthate	17-20-26-38-57-X	3,433	5,360	1.56	4,462
Ethyl oxalate	16-17-X				
Ethyl oxalacetate	X				
Ethyl pelargonate	7-17-20-26-57	449	3,796	8.45	576
Ethyl propionate	17-20-38-X				
Ethyl stearate	X				
Ethyl sulfate	47-X				
Ethyl n-valerate	17-20				
Ethylene bromide	13-30-54	1,056	750	.71	1,122
Ethylene chloride and ethylidene chloride	13-X				
Ethylene chlorohydrin	13-25-X-X			1.32	5,614
Ethyleneglycol	13-X-X				
Ethylene oxide	13-X				
Eugenol methyl ether	17-57				
Fumaric acid	X				
Furfural	20-48-54			6.10	426
Gallic acid	15-30-62-X	147,929	112,515	.76	306,431
Geranyl acetate	17-20-53-57-X	234	1,614	6.90	275
Geranyl butyrate	17-20-57			10.00	40
Geranyl formate	17-20-53-57-X	54	502	9.30	62
Geranyl propionate	17-57				
Glycerol diacetate	20-57-X			1.26	101
Glycerol monochlorohydrin	20				
Glycerophosphates (all other except calcium)	39				
Glycocol	54				
Guanidine and derivatives	44				
Geraniol	X				
Heliotropin	7-19-X	14,211	37,195	2.62	
Heptaldehyde	17-20-57				127
n-Heptyl alcohol	17-38-57-X				11
Hexachloroethane	13-X				
Hexamethylenetetramine	39-42-46-X	995,647	856,294	.86	981,927
Hexamethylenetetramineanhydromethylene citrate	6				
Hydroxycitronellol	X				
Iodobehenic acid	6				
Iodoform	30-33-37-45-49	10,793	42,915	3.98	4,600
Ionone	17-20-23-26-57-X	4,909	37,733	7.69	5,288
a-Ionone	X				
b-Ionone	X				
Iron valerate (valerianate)	52				
Isoamyl acetate	5-17-20-29-38-58-X	295,580	112,797	.38	347,108
Isoamyl butyrate	7-17-20-38-57-X-X	7,813	11,415	1.46	7,334
Isoamyl carbonate	X				
Isoamyl formate	17-20-38-57-X			.71	1,642
Isoamyl iodide	X				
Isoamyl isovalerate	17-38-57-X-X	521	2,083	4.00	454
Isoamyl nitrite	3-41-54			3.70	277
Isoamyl propionate	X				
Isobutyl acetate	17-20-38-X			1.50	587
Isobutyl alcohol	X				
Isobutyl aldehyde	17				
Isobutyl butyrate	17-20-38-57-X			2.27	67
Isobutyl carbonate	X				
Isobutyl formate	17-20-57-X			2.30	67
Isobutyl iodide	X				
Isobutyl isovalerate	X				
Isobutyl propionate	17-20-38-57-X			2.00	47
Isobutyric acid	20-38-54				
Isoeugenol	7-17-20-57-59-X	2,708	12,597	4.65	
Isopropyl acetate	17-20-57-X			1.00	59
Isopropyl alcohol	50-X-X	163,720	63,737	.39	184,470
Isopropyl butyrate	X				
Isopropyl carbonate	X				
Isopropyl formate	X				
Isopropyl oxalate	X				
Isovaleric acid	20-38-52			3.07	3,050
Linalyl acetate	17-20-26-53-57-X	1,492	9,585	6.42	1,746

TABLE 25.—*Production and sales of synthetic organic chemicals during 1921*—Continued.

(Not derived from coal tar.)

Name.	Manufacturers' identification number.	Sales, 1921.			Total production, 1921.
		Quantity.	Value.	Unit value.	
		Pounds.			*Pounds.*
Linalyl formate	17-53-57	49	$555	$11.33	.....
Maleic acid	61-X	.....	.....	.....	.....
dl-Malic acid	54-X	.....	.....	.....	.....
Methylamine	25-44-54	.....	.....	7.43	12
Methyl acetate	20-35-X	.....	.....	.23	14,890
Methyl bromide	54	.....	.....	.....	.....
Methyl n-butyrate	17-38-X	.....	.....	.....	29
Methyl eugenol	53-X	.....	.....	.....	.....
Methyl iodide	15-16-33-54-X	207	1,805	8.72	235
Methyl formate	X	.....	.....	.....	.....
Methyl ionone	X	.....	.....	.....	.....
Methyl isoeugenol	53	.....	.....	.....	.....
Methyl laurate	X	.....	.....	.....	.....
Methyl morphine	37	.....	.....	.....	.....
Methyl oxalate	17-X	.....	.....	.....	.....
Methyl propionate	17	.....	.....	.....	.....
Methyl-pseudo-ionone	X	.....	.....	.....	.....
Methyl sulfate	47	.....	.....	.....	.....
Methylene citric acid	6	.....	.....	.....	.....
Monacetin	X	.....	.....	.....	.....
Monochlorodimethyl ether	6	.....	.....	.....	.....
Neral	57	.....	.....	.....	.....
Nonyl alcohol	17-20-28-57	.....	.....	.....	.....
Nonyl aldehyde	17-20-57	.....	.....	.....	16
Octyl acetate	53	.....	.....	.....	.....
Sec. Octyl acetate	20-57	.....	.....	.....	.....
n-Octyl alcohol (Capryl alcohol)	3-15-16-17-20-53-54-57-61	142	2,430	17.10	726
Sec. Octyl alcohol	17-20-57	51	745	14.61	.....
Octyl aldehyde	17-20-57	.....	.....	.....	.....
Octyl formate	53	.....	.....	.....	.....
Paracetaldehyde	X	.....	.....	.....	.....
Pentachloroethane	13-X	.....	.....	.....	.....
Propionic acid	15-38-X-X	.....	.....	.....	.....
Propionic aldehyde	17	.....	.....	.....	.....
n-Propyl acetate	X	.....	.....	.....	.....
n-Propyl alcohol	X	.....	.....	.....	.....
n-Propyl butyrate	X	.....	.....	.....	.....
n-Propyl carbonate	X	.....	.....	.....	.....
n-Propyl chloride	X	.....	.....	.....	.....
n-Propyl formate	X	.....	.....	.....	.....
n-Propyl isovalerate	X	.....	.....	.....	.....
n-Propyl propionate	17-X	.....	.....	.....	.....
Pseudo ionone	X	.....	.....	.....	.....
Pyrogallic acid	15-30-62	180,997	202,020	1.12	197,337
Pyruvic acid	1-8	.....	.....	.....	.....
Quinine valerate (valerianate)	52	.....	.....	.....	.....
Rhodinal	17-57	.....	.....	.....	.....
Rhodinol acetate	53	.....	.....	.....	.....
Rhodinol formate	53	.....	.....	.....	.....
Sodium diethylbarbiturate	6	.....	.....	.....	.....
Succinic acid	30-51-X	.....	.....	.....	.....
Succinic anhydride	51	.....	.....	.....	.....
Sulfonemethane	43	.....	.....	.....	.....
Terpineol	2-X	.....	.....	.....	.....
Terpin hydrate	45-59	.....	.....	.....	.....
Terpinyl acetate	17-20-26-53-57-X	6,602	9,404	1.42	7,836
s-Tetrachloroethane	13-31-X	.....	.....	.....	.....
Thioninamine	30	.....	.....	.....	.....
Thiourea	44	.....	.....	.....	.....
Triacetin	20-X	.....	.....	.....	.....
Tribromotertiary butyl alcohol	41	.....	.....	.....	.....
Trichloracetic acid	13	.....	.....	.....	.....
Trichlorethylene	13	.....	.....	.....	.....
Trichlorotertiary butyl alcohol	41	.....	.....	.....	.....
Urea	4-X	.....	.....	.....	.....
Urea nitrate	3	.....	.....	.....	.....
Urea oxalate	3	.....	.....	.....	.....
n-Valeric acid	15-20	.....	.....	.....	.....
Vanillic ester	17	.....	.....	.....	.....
Vanillin	19-20-32-59-X-X	210,924	1,675,081	7.94	206,150
Zinc valerate (valerianate)	52	.....	.....	.....	.....
Research chemicals. (See Table 26 for details.)	15-17-26-37-44-54-X	428	7,715	18.02	1,129

TABLE 26.—*Production of chemicals for sale for research and experimental purposes.*

(Not of coal-tar origin.)

Common name.	Manufacturers' identification numbers.	Sales.		Production, 1921.
		Pounds.	Value.	
Total	.....	428	$7,715	*Pounds.* 1,129
Acetal	15	.....	.....	.....
Acetaldehyde sodium bisulfite	15	.....	.....	.....
Acetone sodium bisulfite	15	.....	.....	.....
Acetonitrile	15	.....	.....	.....
Acetylacetone	15	.....	.....	.....
Acetylbromide	15	.....	.....	.....
Acetylmethylurea	15	.....	.....	.....
Adipic acid	15	.....	.....	.....
dl-Alanine	15	.....	.....	.....
Aldehyde C12	17	.....	.....	.....
Aldehyde C14	17	.....	.....	.....
Alloxan	54	.....	.....	.....
Alloxantin	54	.....	.....	.....
Allyl alcohol	15	.....	.....	.....
Allyl bromide	15	.....	.....	.....
Allyl sulfide	15	.....	.....	.....
Allylthiourea	15	.....	.....	.....
Amino-n-caproic acid	54	.....	.....	.....
a-Amino-iso-butyric acid	15	.....	.....	.....
dl-a-Amino-n-valeric acid	15	.....	.....	.....
n-Amyl alcohol	15-54	.....	.....	.....
Amyl alcohol (tertiary)	15	.....	.....	.....
n-Amylamine	15-54	.....	.....	.....
n-Amyl ether	15	.....	.....	.....
Barbituric acid	15	.....	.....	.....
d-Bornyl acetate	15	.....	.....	.....
Bromoacetic acid	15	.....	.....	.....
Bromoacetyl bromide	15	.....	.....	.....
a-Bromo-n-butyric acid	15	.....	.....	.....
a-Bromopropionic acid	15	.....	.....	.....
b-Bromopropionic acid	15	.....	.....	.....
a-Bromo-iso-valeric acid	15	.....	.....	.....
a-Bromo-n-valeric acid	15	.....	.....	.....
n-Butyl acetate	15	.....	.....	.....
sec. Butyl acetate	15	.....	.....	.....
Butyl alcohol (tertiary)	15	.....	.....	.....
n-Butyl bromide	15	.....	.....	.....
n-Butyl-n-butyrate	15	.....	.....	.....
n-Butyl carbamate	15	.....	.....	.....
n-Butyl carbonate	15	.....	.....	.....
n-Butyl chlorocarbonate	15	.....	.....	.....
n-Butyl citrate	15	.....	.....	.....
n-Butyl ether	15	.....	.....	.....
n-Butyl formate	15	.....	.....	.....
n-Butyl iodide	15	.....	.....	.....
n-Butyl mercaptan	15	.....	.....	.....
n-Butyl nitrite	15	.....	.....	.....
n-Butyl oxalate	15	.....	.....	.....
n-Butyl sulfide	15	.....	.....	.....
n-Butyl tartrate	15	.....	.....	.....
b-Butylene bromide	15	.....	.....	.....
n-Butyraldehyde	15	.....	.....	.....
n-Butyramide	15	.....	.....	.....
n-Butyronitrile	15	.....	.....	.....
n-Butyryl chloride	15	.....	.....	.....
Capric acid	15	.....	.....	.....
n-Caproic acid	54	.....	.....	.....
n-Caprylic acid	15	.....	.....	.....
Carvacrol	15	.....	.....	.....
Cavone	15	.....	.....	.....
Catechol	15	.....	.....	.....
Chloral	15	.....	.....	.....
Chloral alcoholate	15	.....	.....	.....
Chloroacetal	15	.....	.....	.....
Chloroacetone	15	.....	.....	.....
Chloroacetyl chloride	15	.....	.....	.....
Chloromethyl ether	15	.....	.....	.....
Citronellol acetate	26	.....	.....	.....
Citronellol butyrate	26	.....	.....	.....
Citronellol formate	26	.....	.....	.....
Citronellol propionate	26	.....	.....	.....
Cyanamide derivatives	44	.....	.....	.....
p-Cymene	15	.....	.....	.....
Decane (di-iso-amyl)	15	.....	.....	.....
Diacetyl monoxime	15	.....	.....	.....
s-Dichloromethyl ether	15	.....	.....	.....
Dichlorovinyl ether	X	.....	.....	.....

TABLE 26.—*Production of chemicals for sale for research and experimental purposes*—Con.

[Not of coal tar origin.]

Common name.	Manufacturers' identification numbers.	Sales.		Production, 1921.
		Pounds.	Value.	
				Pounds.
Dicyandiamidine sulfate	15			
p-s-Dihydroxyethyl sulfide	15			
Diglycollic acid	15			
Dihydroxystearic acid	15			
Dimethyl acetal	15			
Dimethylamine (33 per cent in water)	15			
Dimethylamine hydrochloride	15			
Dimethylammonium dimethyldithiocarbamate	15			
Dimethylglyoxime	15			
Dinitrine carbonic ester	37			
Epichlorohydrin	15			
Ethyl adipate	15			
Ethyl a-ester	15			
Ethyl a-bromo-n-butyrate	15			
Ethyl a-bromopropionate	15			
Ethyl a-bromo-n-valerate	15			
Ethyl n-caprate	15			
Ethyl n-capronate	15			
Ethyl caprylate	15			
Ethyl carbamate	15			
Ethyl carbonate	15			
Ethyl chloroacetate	X			
Ethyl chlorocarbonate	15			
Ethyl cyanoacetate	15			
Ethyl dibromoacetate	15			
Ethyl dichloroacetate	15			
Ethyl disulfide	15			
Ethyl laurate	15			
Ethyl myristate	15			
Ethyl nitrate	15			
Ethyl oxalate	15			
Ethyl sebacate	15			
Ethyl succinate	15			
Ethyl sulfide	15			
Ethyl tartrate	15			
Ethyl thiocyanate	15			
Ethyl trichloroacetate	15			
Ethyl n-valerate	15			
Ethylal	15			
Ethylamine (33 per cent in water)	15			
Ethylamine hydrobromide	15			
Ethylamine hydrochloride	15			
Ethylene chlorobromide	15			
Ethylenediamine hydrobromide	15			
Ethylidene chloride	15			
Eugenol methyl ether	15			
Formamide	15			
Furfural	15			
Glutaric acid	15			
Glycerol diacetate	15			
Glycerol monochlorohydrin	15			
Glycine	15			
Glycine ethyl ester hydrochloride	15			
Guanidine derivatives	44			
Heptaldehyde	15			
a-Heptyl alcohol	15			
a-Heptyl bromide	15			
n-Hexane	15			
a-Hexyl alcohol	15			
b-Hydroxypropionitrile	15			
b-Iodopropionic acid	15			
Isoamyl bromide	15			
Isoamyl n-caprate	15			
Isoamyl n-caprylate	15			
Isoamyl carbamate	15			
Isoamyl ether	15			
Isoamyl formate	15			
Isoamyl iodide	15			
Isoamyl oxalate	15			
Isoamyl nitrite	15			
Isoamyl sulfide	15			
Isobutyl bromide	15			
Isobutyl iodide	15			
Isobutyric acid	15			
Isobutyraldehyde	15			
Isocaproic acid	15			

TABLE 26.—*Production of chemicals for sale for research and experimental purpos*

[Not of coal tar origin.]

Common name.	Manufacturers' identification numbers.	Sales.	
		Pounds.	Value.
Isocapronitrile	15		
Isopropyl bromide	15		
Isopropyl iodide	15		
Isovaleraldehyde	15		
Lauric acid	15		
Malonic acid	15		
p-Menthane	15		
l-Menthyl acetate	15		
Mesitylene	15		
Methylal	15		
Methylamine	15		
Methylamine hydrochloride	15		
Methyl n-butyrate	15		
Methyl n-butyl carbinol	15		
Methyl n-caproate	15		
Methyl carbonate	15		
Methyl chlorocarbonate	15		
Methyl n-heptylate	15		
Methyl laurate	15		
Methyl malonate	15		
Methyl myristate	15		
Methyl palmitate	15		
Methyl propionate	15		
Methyl n-propyl carbinol	15		
Methyl stearate	15		
Methyl sulfide	15		
Methyl thiocyanate	15		
Methyl n-valerate	15		
Methylurea	15		
Methyleneaminoacetonitrile	15		
Methylene iodide	15		
Nitromethane	15		
Nitrosotriacetonamine	15		
Nitrourea	15		
n-Octane	15		
n-Octyl alcohol	15-X		
Sec. octyl alcohol	15		
Oxamide	15		
Potassium ethylsulfate	15		
Potassium formate	15		
Potassium methylsulfate	15		
Propionaldehyde	15		
Propionamide	15		
Propionitrile	15		
n-Propylamine	15		
n-Propyl bromide	15		
n-Propyl n-butyrate	15		
n-Propyl carbomte	15		
n-Propyl chlorocarbonate	15		
n-Propyl iodide	15		
n-Propyl oxalate	15		
n-Propyl propionate	15		
Pyrogallol	15		
Quinine ethyl carbonic ester	37		
Rhodinol butyrate	26		
Rhodinol propionate	26		
Sebacic acid	15		
Semicarbazide hydrochloride	15		
Sodium malonate	15		
Sodium succinate	15		
Stearic acid	15		
s-Tetrabromoethane	15		
Tetramethylammonium bromide	15		
Triacetonamine hydrate	15		
Tri-n-butyl carbinol	15		
Tributyrin	15		
Triethylamine	15		
Triethyl carbinol	15		
Trimethylene bromide	15		
Trimethylene chlorohydrin	15		
Trimethylene chloride	15		
Trimethylene cyanide	15		
Undecylenic acid	15		
Urea nitrate	15		
n-Valeramide	15		
Vinyl chloride	X		

TABLE 27.—*Domestic production of organic chemicals (except coal tar).*

[From Bureau of the Census; 1919 figures are preliminary.]

Chemical.	1914			1919		
	Quantity.	Value.	Unit value.	Quantity.	Value.	Unit value.
	Pounds.			*Pounds.*		
Acetic acid (pyroligneous)	70,617,600	$1,272,300	$0.02	46,821,000	$2,816,300	$0.06
Acetic acid (glacial)				5,050,000	869,200	.17
Acetic anhydride				1,213,200	578,000	.48
Lactic acid				5,054,500	781,500	.15
Oxalic acid				2,103,500	545,600	.25
Tartaric acid				5,313,000	4,252,400	.80
Formaldehyde	8,425,200	655,200	.08	19,663,800	3,938,300	.20
Other aldehydes					1,794,300	
Amyl acetate	1,300,000	465,700	.36	704,000	350,600	.50
Ethyl acetate				2,251,000	340,000	.15
Ethyl chloride				248,100	166,200	.67
Other esters					1,114,400	
Ethyl ether	2,120,000	278,800	.13	4,111,800	1,103,700	.27
Other ethers					22,000	
Acetone	10,425,800	1,099,600	.11	6,045,900	767,000	.13
Methyl ethyl ketone				1,158,000	167,700	.14
Other ketones					225,100	
Carbon tetrachloride				9,811,800	803,600	.08
Chloroform	1,334,000	295,300	.22	1,677,600	516,600	.31
Vanillin	120,600	525,200	4.36	134,700	1,365,900	10.14
Quinin and salts				2,312	296,392	128.50
Morphin and salts	2,305			702	178,885	255.00
Cocaine and salts	25,891			516	90,454	175.00
Methyl alcohol (wood) (gallons)				73,200	105,100	.14

TABLE 28.—*Imports and production of synthetic organic chemicals (except those of coal-tar origin), 1914 and 1921.*

Articles.	1921 (calendar year).			1921 production (pounds).	1914 (fiscal year).			1914 production (pounds).
	Pounds.	Value.	Unit value.		Pounds.	Value.	Unit value.	
Acetic acid	32,715	$2,659	$0.08		27,743	$1,952	$0.07	70,617,600
Formic acid	422,288	51,766	.12		1,119,745	48,826	.04	
Salicylic acid	2,260	904	.40	306,431	61,635	20,429	.33	
Hypophosphoric acid and salts of	6,595	8,169	1.24		24,789	23,066	.93	
Lactic acid	593,385	44,986	.08		276,237	30,223	.11	
Oxalic acid	1,016,471	151,497	.15		8,780,852	433,783	.05	
Pyrogallic acid	22	45	2.05	197,337	23,615	20,496	.87	
Tannic acid	435	1,342	3.09		1,161	750	.65	
Methyl alcohol	1,033	2,836	2.75		109,022	52,598	.39	
Carbon tetrachloride	100,380	2,705	.03	5,406,995	572,910	28,300	.05	
Chloroform	4,512	615	.14	111,000	2,444	990	.41	1,334,000
Chloral hydrate	1,905	1,758	.92	48,615	644	241	.37	
Cocaine, eegonine and salts of	7,065	18,428	2.60	105	3,291	4,101	1.25	
Ethers containing not more than 10 per cent of alcohol:								
Ethyl acetate	30	8	.27	5,307,078	110	20	.18	
Ethyl chloride	9,697	5,351	.55	106,813	9,014	10,046	1.11	
Fruit, containing no alcohol	44	101	2.30		1,309	1,719	1.31	
Sulphuric	216	253	1.17	3,025,041	915	131	.14	2,120,000
Others, n. s. p. f.	484	752	1.55		12,036	5,049	.42	
Ethers containing more than 10 per cent of alcohol and not more than 20 per cent	240	274	1.14					
All on which specific duty does not amount to 25 per cent					387	1,845	4.77	
Ethers containing more than 20 and not more than 50 per cent of alcohol					2	3	1.50	
Formaldehyde solution containing not more than 40 per cent of formaldehyde or formalin	86,281	16,709	.19		14,228	1,443	.10	8,426,200
Iodoform	7	27	3.85	4,606	86	301	3.50	
Urea	35,339	8,906	.25	10,120	17,981	8,798	.49	

TABLE 29.—SYNTHETIC ORGANIC CHEMICALS IMPORTED IN EXCESS OF $100 IN VA DURING THE YEAR ENDED JUNE 30, 1914.[1]

Articles.	Quantity.	Value.	Articles.	Quantity.	V
	Pounds.			*Pounds.*	
Acetin (commercial)	15,958	$2,425	Gallic acid	61,644	$
Acetylenetetrachloride (tetrachloroethane)	93,581	5,636	Geranyl acetate	198	
Ammonium valerate	1,801	1,637	Heliotropin, crystals	10,219	
Amyl butyrate	350	181	Hexamethylenetetramine	11,470	
Amyl nitrite		122	Iodoform	93	
Amylene	26	100	Ionone:		
Aubepine:			Alcoholic solution	50	
Technical	1,302	864	For soap	104	
Liquid	2,101	2,901	Alpha, pure	35	
Barbituric acid	39,924	2,837	Iron valerate	1,109	
Butyric acid, 60 per cent	51,530	13,467	Methyl aniline, pure	13	
Pure	13	41	Methyl iodide	26	
Calcium glycerophosphate:			Monochloracetic acid:		
Granulated, 6 per cent	4,697	814	Commercial	12,834	
Liquid, 50 per cent	15,757	9,935	Pure crystals	318	
Soluble	1,347	1,611	Octyl aldehyde	4	
Granulated, effervescent	305	849	Pyrogallic acid	24,964	
Camphoric acid	75	138	Quinine valerate	203	
Carbon tetrachloride	572,987	28,322	Rhodinal	181	
Chloral hydrate	800	298	Succinic acid:		
Chloroform	2,745	2,086	Crude sublimed	35	
Citronellol	1,526	4,318	Pure crystals	620	
Cocaine [2]	3,340	4,163	Anhydrous	54	
Codeine, alkaloid	32	1,669	Terpin hydrate	12,797	
Phosphate [2]	335	773	Terpinyl acetate	19,473	
Sulphate [2]	1,275	2,648	Thiosinamine	111	
Dichlorohydrin	782	500	Thymol	19,056	
Dimethylglyoxime	28	301	Trichloracetic acid:		
Ethyl butyrate (absolute)	1,363	515	Technical	4	
Ethyl carbonate	6	311	U. S. P	439	
Ethyl chloride	9,137	10,260	Urea	18,137	
Ethyl ether	992	160	Valeric (Valerianic) acid	1,164	
Over sodium	3,512	870	Vanillin [2]	38,472	
Reagent	122	119	Veronol (diethyl barbituric acid)	4,971	
Eugenol:			Veronol sodium (sodium diethylbarbiturate)	593	
Crude	5	4	Zinc valerate, powder	1,517	
Other	485	987			

[1] Miscellaneous Series No. 82, Department of Commerce. [2] Ounces.

TABLE 30.—IMPORTS FOR CONSUMPTION, 1921—SYNTHETIC ORGANIC CHEMICAL

Chemicals.	Quantity.	Value.	Chemicals.	Quantity.	Va
	Pounds.			*Pounds.*	
Ethyl chloride	9,697	$5,351	Ethers, n. s. p. f	484	
Chloroform	4,512	615	Cocaine salts [1]	7,065	1
Ethyl acetate (acetic ether)	30	8	Urea	35,339	
Gallic acid	2,260	904	Thymol	17,455	4
Carbon tetrachloride	100,380	2,705	Valerianic acid	435	
Glycerophosphoric and salts and compounds	6,595	8,169	Vanillin	26,456	1
Iodoform	7	27	Pyrogallic acid	22	
Sulphuric ether	216	253	Chloral hydrate	1,905	

[1] Ounces.

Directory of manufacturers of synthetic organic chemicals, 1921.

(Not derived from coal tar.)

No.	Name of company.	Office address (location of plant given in pa theses if not in same city as office).
1	Abbott Laboratories, The	4753 Ravenswood Ave., Chicago, Ill.
2	American Aniline Products, Inc	80 Fifth Ave., New York City. (Nyack, N.
3	American Chemical Products Co	73 Chatham St., Rochester, N. Y.
4	American Cyanamid Co	511 Fifth Ave., New York City. (War N. J.)
5	Anderson Chemical Co	266 Lodi Ave., Wallington, N. J.
6	Bayer Company, Inc., The	117 Hudson St., New York City. (Renss N. Y.)

Directory of manufacturers of synthetic organic chemicals, 1921—Continued.

No.	Name of company.	Office address (location of plant given in parentheses if not in same city as office).
7	Bush & Co., Inc., W. J.	370 Seventh Ave., New York City. (Linden, N. J.)
8	Calco Chemical Co., The	Bound Brook, N. J.
9	Carbide and Carbon Chemicals Corp.	30 East 42d St., New York City. (Clendenin, W. Va.)
10	Chiris Co., Antoine	147 Waverly Place, New York City. (Delawanna, N. J.)
11	Commercial Solvents Corp	17 E. 42d St., New York City. (Terre Haute, Ind.)
12	Cooper & Co., Inc., Charles	194 Worth St., New York City. (Newark, N. J.)
13	Dow Chemical Co., The	Midland, Mich.
14	Du Pont de Nemours & Co., E. I.	1007 Market St., Wilmington, Del. (Parlin & Gibbstown, N. J.)
15	Eastman Kodak Co	Rochester, N. Y. (Kodak Parks Works, Rochester, N. Y.)
16	Eimer & Amend	205-211 3d Ave., New York City. (Newark, N. J.)
17	Florasynth Laboratories, Inc.	Olmstead & Starling Ave., Unionport, N. Y.
18	Franco-American Chemical Works	Carlstadt, N. J.
19	Fries Bros.	92 Reade St., New York City. (Bloomfield, N. J.)
20	Fries & Fries Co., The	1501 W. 6th St., Cincinnati, Ohio.
21	Gebauer Chemical Co., The	619 Bangor Bldg., Cleveland, Ohio (9408 St. Catherine Ave., Cleveland, Ohio.)
22	Great Western Electro-Chemical Co	9 Main St., San Francisco, Calif. (Pittsburgh, Calif.)
23	Haarmann-de-Laire-Schaefer Co.	Maywood, N. J.
24	Harmer Laboratories Co., The	Baltimore and Hirst Ave., East Lansdowne, Pa.
25	Hirsch Laboratories (Inc.), The	50 E. 41st St., New York City. (Brooklyn, N. Y.)
26	Ising Corporation, The C. E	Flushing, L. I., N. Y.
27	Lakeview Laboratories	2 Jersey St., Buffalo, N. Y.
28	La Motte Chemical Products Co.	13 W. Saratoga St., Baltimore, Md.
29	Maas & Waldstein Co	92 William St., New York City. (Newark, N. J.)
30	Mallinckrodt Chemical Works	3600 N. 2d St., St. Louis, Mo.
31	Mathieson Alkali Works (Inc.), The	25 West 43d St., New York City. (Niagara Falls, N. Y.)
32	Maywood Chemical Works	Hunter Ave., Maywood, N. J.
33	Merck & Co	45 Park Place, New York City. (Rahway, N. J.)
34	Metz Laboratories (Inc.), H. A	122 Hudson St., New York City. (Brooklyn, N. Y.)
35	Miner-Edgar Co., The	110 William St., New York City. (Newark, N. J.)
36	Monsanto Chemical Works	1724 So. 2d St., St. Louis, Mo.
37	New York Quinine & Chemical Works (Inc.)	135 William St., New York City.
38	Northwestern Chemical Co.	Wauwatosa, Wis.
39	Norvell Chemical Corporation, The	11 Cliff St., New York City. (Perth Amboy, N. J.)
40	Organo Chemico Co	1636 Columbus Ave., Sandusky, Ohio.
41	Parke, Davis & Co	Detroit, Mich.
42	Perth Amboy Chemical Works	709 6th Ave., New York City. (Perth Amboy, N. J.)
43	Pharma-Chemical Corporation	233 Broadway, New York City. (Bayonne N. J.)
44	Phillips, Ross	Canandaigua, N. Y.
45	Powers-Weightman-Rosengarten Co.	916 Parrish St., Philadelphia, Pa.
46	Redmanol Chemical Products Co.	636 W. 22d St., Chicago, Ill.
47	Rhodia Chemical Co.	89 Fulton St., New York City. (New Brunswick, N. J.)
48	Special Chemicals Co.	Erskine Bank Building, Highland Park, Ill.
49	Squibb & Sons, E. R.	80 Beekman St., New York City. (Brooklyn, N. Y., and New Brunswick, N. J.)
50	Standard Oil Co. of New Jersey	26 Broadway, New York City. (Elizabeth, N. J.)
51	Stearns & Co., Frederick	Jefferson and Bellevue Avenues, Detroit, Mich.
52	Sterling Chemical Works (Inc.)	115 Broadway, New York City. (344 Thomas St., Newark, N. J.)
53	Synfleur Scientific Laboratories (Inc.)	33 Bedford Ave., Monticello, N. Y.
54	Synthetical Laboratories of Chicago	1326 West Congress St., Chicago, Ill.
55	T. M. & G. Chemical Co.	Belleville, N. J.
56	U. S. Industrial Chemical Co. (Inc.)	Curtis Bay, Baltimore, Md.
57	Van Dyk & Co.	4-6 Platt St., New York City. (Jersey City, N. J.)
58	Van Schaack Bros. Chemical Works (Inc.)	3358 Avondale Ave., Chicago, Ill.
59	Verona Chemical Co.	26 Verona Avenue, New York, N. J.
60	Warner Klipstein Chemical Co.	52 Vanderbilt Ave., New York City. (South Charleston, W. Va.)
61	Will Corporation	845 Maple St., Rochester, N. Y.
62	Zinsser & Co.	Hastings upon Hudson, N. Y.

PART V.

APPENDIX.

STATISTICS OF IMPORTS AND EXPORTS.

PART V.

STATISTICS OF IMPORTS AND EXPORTS.

TABLE I.—*Imports of coal-tar products entered for consumption, 1917 to 1921.*

[Act of Sept. 8, 1916.]

GROUP I, CRUDE (FREE).

	Calendar years.			
	1917		1918	
	Quantity.	Value.	Quantity.	Value.
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate..pounds..	151,254	$9,894	155,236	$17,260
Anthracene oil.....gallons..	61,200	3,105	.....	.....
Benzol.....pounds..	3,598,733	341,700	2,673,855	87,570
Cresol.....do....	7,665,442	532,529	8,873,271	779,045
Dead or creosote oil.....gallons..	9,817,085	786,638	1,545,247	162,869
Naphthalene having a solidifying point less than 79° C. .....pounds..	5,206,980	175,554	3,902,731	130,098
Pyridine and quinoline.....do....	12,247	1,480	9,237	1,036
Coal tar, crude.....barrels..	6,780	10,745	13,087	21,200
Pitch, coal tar.....do....	5,926	12,039	14,029	29,095
Metacresol, orthocresol, and paracresol—purity less than 90 per cent.....pounds..	20,708	1,404	.....	.....
Xylol.....do....	9,332	2,928	.....	.....
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f. .....pounds..	.....	10,448	.....	2,756
All other distillates, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate .....pounds..	.....	1,502	.....	10,473
Anthracene, purity less than 25 per cent.....do....	(1)	(1)	18	5
Acemphthene, cumol fluorene, methylanthracene, and methylnaphthalene.....pounds..	(1)	(1)	.....	.....
Carbazol, purity less than 25 per cent.....do....	(1)	(1)	.....	.....

	Calendar years.					
	1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate .....pounds..	1,965,289	$187,788	192,692	$19,848	214,185	$22,849
Anthracene oil.....gallons..	18,699	3,994	15,054	3,945	12,776	5,019
Benzol.....pounds..	217,865	5,617	486,619	10,868	1,722,085	442,370
Cresol.....do....	6,435,650	557,214	10,318,070	901,381	3,353,882	253,886
Dead or creosote oil.....gallons..	11,268,379	1,374,217	18,427,152	3,796,399	33,239,432	4,756,618
Naphthalene having a solidifying point less than 79° C.....pounds..	3,239,256	92,265	15,012,096	530,219	4,495,806	135,943
Pyridine and quinoline.....do....	165,064	20,543	863,456	168,800	72,515	11,367
Coal tar, crude.....barrels..	22,339	38,476	11,901	24,140	21,551	46,784
Pitch, coal tar.....do....	3,364	8,598	8,780	26,022	417	1,264
Metacresol, orthocresol, and paracresol—purity less than 90 per cent.....pounds..	11,200	1,221	.....	.....	.....	.....
Toluol.....do....	1,195,706	30,768	.....	.....	.....	.....

[1] Imports not available by calendar year.

TABLE I.—*Imports of coal-tar products entered for consumption, 1917 to 1921*—Con.

GROUP I, CRUDE (FREE)—Continued.

	Calendar years.					
	1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f.....pounds..	380,525	$6,334	240,096	$14,046	40,707	$3,111
All other distillates, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate.....pounds..	104,568	10,548	.....	.....	7,310	959
Anthracene, purity less than 25 per cent.....pounds..	82,669	2,022	202,569	16,590	58,111	1,198
Acenaphthene, cumol fluorene, methylanthracene and methylnaphthalene.....pounds..	15,759	946	.....	.....	100	64
Carbazol, purity less than 25 per cent.....pounds..	112	82	.....	.....	.....	.....

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND).

Article and years.	Quantity.	Value.	Duty.	Actual and computed ad valorem rate.
Not colors, dyes or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.:				
Acids—				
Amidosalicylic—	*Pounds.*			*Per cent.*
1917	.....	.....	.....	.....
1918	.....	.....	.....	.....
1919	.....	.....	.....	.....
1920	11,199	$8,182	$1,507	18.42
1921	.....	.....	.....	.....
Benzoic—				
1917	4,653	20,539	3,190	15.53
1918	1,791	14,060	2,154	15.32
1919	63	374	58	15.42
1920	250	1,087	169	15.58
1921	11,263	3,012	733	24.35
Carbolic (phenol) which on being subjected to distillation yields in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate—				
Crystal—				
1917	30,676	4,954	1,510	30.48
1918	148,261	47,085	10,769	22.87
1919	.....	.....	.....	.....
1920	.....	.....	.....	.....
1921	250	142	28	19.40
Liquid—				
1917	314,585	24,246	11,502	47.44
1918	134,406	15,186	5,638	37.13
1919	2,061	264	91	34.52
1920	1,040	244	63	25.66
1921	.....	.....	.....	.....
Salicylic—				
1917	26,273	23,575	4,193	17.79
1918	117	112	20	17.62
1919	.....	.....	.....	.....
1920	.....	.....	.....	.....
1921	.....	.....	.....	.....
Amidonaphthol—				
1917	.....	.....	.....	.....
1918	.....	.....	.....	.....
1919	150	72	15	20.21
1920	.....	.....	.....	.....
1921	11,025	9,990	1,774	17.76

TABLE I.—*Imports of coal-tar products entered for consumption, 1917 to 1921*—Con.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND)—Continued.

Article and years.	Quantity.	Value.	Duty.	Actual and computed ad valorem rate.
Not colors, dyes or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.—Continued.				
Amidophenol—	*Pounds.*			*Per cent.*
1917				
1918				
1919	1,028	$2,417	$388	16.06
1920				
1921	14,623	11,699	2,120	18.12
Aniline oil—				
1917				
1918				
1919				
1920	220	72	16	22.64
1921	11,243	1,799	551	30.62
Aniline salt—				
1917				
1918	21,273	3,250	1,019	31.36
1919				
1920	4	1	.25	25.00
1921	18,316	12,109	2,274	18.78
Anthracene, purity of 25 per cent or more—				
1917				
1918				
1919	51,895	8,011	2,490	31.19
1920	648,095	87,413	29,314	33.54
1921	261,645	12,639	8,437	66.75
Anthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
1921	127,427	78,255	14,924	19.07
Benzaldehyde—				
1917				
1918				
1919	24,472	17,790	3,280	18.44
1920	9,479	5,928	1,126	19.00
1921	1,056	465	96	20.68
Benzylchloride—				
1917	5	7	1	16.86
1918				
1919	1,900	430	90	20.81
1920	150	22	7	32.05
1921				
Binitrotoluol—				
1917	61,632	10,471	3,111	29.71
1918	22,635	3,333	1,066	31.98
1919	6,896	1,331	372	27.95
1920	4,692	1,216	300	24.64
1921	1,164	155	52.00	33.77
Binitrobenzol—				
1921	5	3	.58	19.33
Carbazol, purity of 25 per cent or more—				
1917				
1918				
1919				
1920	157	27	8	29.56
1921				
Dimethylaniline—				
1917				
1918				
1919	1,120	427	92	21.56
1920	22,400	15,968	2,955	18.51
1921				
Metacresol, orthocresol, and paracresol, purity of 90 per cent or more—				
1917				
1918				
1919				
1920	2,444	2,230	396	17.74
1921	556	341	65	19.08
Methylanthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
1921				

TABLE I.—*Imports of coal-tar products entered for consumption, 1917 to 1921*—C

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND)—Continued.

Article and years.	Quantity.	Value.	Duty.	Actu and c puted valor rat
Not colors, dyes or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.—Continued.				
Naphthalene solidifying at 79° C. or above—	*Pounds.*			*Per c*
1917	267,057	$12,125	$8,497	7
1918	2,795	171	96	5
1919	7,650	384	249	6
1920	3,697,562	416,172	154,865	3
1921	441,685	31,458	15,761	3
Naphthol—				
1917	1,027	1,069	186	17
1918				
1919				
1920				
1921	333,356	112,922	25,272	22
Naphthylamine—				
1917				
1918	11,701	5,985	1,192	19
1919				
1920	69,695	7,208	2,824	39
1921				
Nitrobenzol—				
1917				
1918				
1919	21,513	4,003	1,138	28
1920	45,891	6,009	2,049	34
1921				
Nitronaphthalene—				
1917	18,102	7,758	1,616	20
1918				
1919				
1920				
1921				
Nitrophenylenediamine—				
1921	1,132	6,590	1,017	15
Nitrotoluol—				
1917				
1918				
1919	542	452	81	18
1920	684	359	71	19
1921				
Phenylenediamine—				
1917				
1918				
1919	2,746	1,769	334	18
1920	2,429	1,887	344	18
1921				
Phthalic anhydride—				
1917	98	1,853	280	15
1918				
1919				
1920				
1921				
Resorcin—				
1917	134	672	104	15
1918				
1919				
1920	51,529	39,932	7,278	18
1921	109,658	75,022	13,995	18
Tolylenediamine—				
1921	175	238	40	16
Xylidine—				
1917				
1918				
1919				
1920	56,047	41,237	7,587	18
1921				
All distillates, n. s. p. f., which on distillation yield in the portion distilling below 200° C. a quantity of tar acid equal to or more than 5 per cent of the original distillate:				
1917				
1918	1,550	2,008	340	16
1919	3,170	4,587	767	16
1920	85,474	36,041	7,543	20
1921	16,240	11,811	2,178	18

BLE I.—*Imports of coal-tar products entered for consumption, 1917 to 1921*—Con.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND).—Continued.

Article and years.	Quantity.	Value.	Duty.	Actual and computed ad valorem rate.
similar products, obtained, derived, or manufactured in whole or in part from the products provided for in Group I (free):	*Pounds.*			*Per cent.*
1917	193,021	$17,595	$7,465	42.43
1918	13,445	8,640	1,632	18.89
1919	51,214	39,861	7,260	18.21
1920	87,911	74,514	13,375	17.95
1921	87,207	41,965	8,475	20.19
ll sulfoacids or sulfoacid salts of Group II:				
1917				
1918				
1919				
1920	100	87	16	17.88
1921	6,789	2,944	611	20.76
GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM).				
hen obtained, derived, or manufactured in whole or in art from any of the products provided for in Group I free) or II, including natural indigo and their deriva- tives:				
Alizarin, natural—	*Pounds.*			*Per cent.*
1917	6,899	$12,216	$3,665.00	30.00
1918	108,711	158,816	47,644.80	30.00
1919	6,684	8,612	2,583.60	30.00
1920	58,583	41,381	12,414.30	30.00
1921	59,306	81,816	24,544.80	30.00
Alizarin, synthetic—				
1917	19,180	55,179	16,554.00	30.00
1918				
1919				
1920	73,232	24,072	7,221.60	30.00
1921	136,283	49,707	14,912.10	30.00
Dyes obtained, derived, or manufactured from alizarin—				
1917	34	75	22.50	30.00
1918	6,446	13,399	4,019.70	30.00
1919	1,920	3,864	1,159.20	30.00
1920	29,436	25,489	7,646.70	30.00
1921	246,837	356,658	106,997.40	30.00
Dyes obtained, derived, or manufactured from anthracene and carbazol—				
1917	23,146	11,326	3,398.00	30.00
1918	12,827	20,087	6,026.10	30.00
1919	7,162	7,772	2,331.60	30.00
1920	216,508	208,754	62,626.20	30.00
1921	226,956	422,941	126,882.30	30.00
Indigoids, whether or not obtained from indigo—				
1917	129,983	140,932	42,280.00	30.00
1918	3,376	13,744	4,123.20	30.00
1919	34,049	82,779	24,833.70	30.00
1920	86,439	196,783	59,034.90	30.00
1921	76,123	72,154	21,646.20	30.00
Flavors—				
1917	35	408	122.00	30.00
1918	160	816	244.80	30.00
1919				
1920	14	27	8.10	30.00
1921				
Indigo, natural—				
1917	2,261,122	4,230,510	1,269,153.00	30.00
1918	1,637,914	2,007,958	602,387.40	30.00
1919	234,991	285,925	85,777.50	30.00
1920	36,537	69,528	20,858.40	30.00
1921	77,121	154,538	46,361.40	30.00
Indigo, synthetic—				
1917	1,379,349	871,267	261,380.00	30.00
1918	690,414	342,589	102,776.70	30.00
1919	537,697	327,133	98,139.90	30.00
1920	171,101	207,299	62,189.70	30.00
1921	70,975	84,901	25,470.30	30.00
Medicinals—				
1917		284,346	85,304.00	30.00
1918		301,074	90,322.20	30.00
1919		168,466	50,539.80	30.00
1920		165,055	49,516.50	30.00
		280,299	84,089.70	30.00

TABLE I.—*Imports of coal-tar products entered for consumption, 1917 to 1921—*

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM)—Continued.

Article and years.	Quantity.	Value.	Duty.	A and pa val
When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives:				
Colors, or color lakes obtained, derived, or manufactured from alizarin—	*Pounds.*			*Pe*
1917	7,062	$18,680	$5,957.00	
1918	1,490	4,490	1,421.95	
1919	15,358	14,405	5,089.40	
1920	98,735	172,841	56,789.05	
1921	59,290	66,171	22,815.80	
Colors, or color lakes obtained, derived, or manufactured from anthracene and carbazol—				
1917	53,205	49,729	17,579.00	
1918	27,900	22,546	8,158.80	
1919	38,073	55,475	18,546.15	
1920	260,060	529,966	171,992.80	
1921	62,748	65,635	22,827.90	
All other colors, dyes, or stains, whether soluble or not in water, color acids, color bases, or color lakes—				
1917	2,257,476	2,574,363	885,183.00	
1918[1]	1,799,467	2,161,799	738,513.05	
1919	1,991,687	2,848,294	954,072.55	
1920	2,807,807	4,093,389	1,368,407.05	
1921	2,751,535	3,968,319	1,328,072.45	
Phenolic resin, synthetic—				
1917	134,702	11,596	10,214.00	
1918				
1919	1,114	2,860	913.70	
1920	2,479	2,681	928.25	
1921	1,420	2,366	780.80	
Photographic chemicals—				
1917	12,632	101,406	31,053.00	
1918	14,550	108,537	33,288.60	
1919	12,059	77,876	23,905.75	
1920	21,808	67,640	21,382.40	
1921	28,281	65,906	21,235.85	
Acetanilid (25 per cent), 1919	124	50	12.00	
Acetphenetidin (25 per cent):				
1917	3,280	40,352	10,088.00	
1918				
1919				
1920				
1921				
Acetylsalicylic acid (25 per cent):				
1917	1,474	4,670	1,168.00	
1918				
1919	26	76	19.00	
1920				
1921				
Antipyrene (25 per cent):				
1917	21,842	62,411	15,603.00	
1918	9,416	105,643	26,661.00	
1919	13,736	135,565	33,891.00	
1920	14,737	53,293	13,323.00	
Aspirin[2] (25 per cent)				
Salol[2] (25 per cent)				
Phenolphthalein (25 per cent):				
1917				
1918	100	1,200	300.00	
1919				
1920	200	726	181.00	
1921	5,055	2,385	596.25	
Saccharin (65 cents per pound):				
1917	554	6,544	360.00	
1918				
1919				
1920	40	39	26.00	
1921	46	103	29.90	

[1] Does not include 110 pounds, valued at $322, duty $81.68, from Cuba.
[2] Included under acetylsalicylic acid.
[3] Dutiable under the act of Oct. 3, 1913, rather than under the act of Sept. 8, 1916.

TABLE I.—*Imports of natural dyes and extracts of, entered for consumption, 1917 to 1921*—Continued.

Calendar year.	Annatto.		Cochineal.		Cudbear.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
1917	660,102	$77,238	121,879	$48,345	55,897	$7,515
1918	655,250	62,961	237,402	116,660	54,447	9,411
1919	356,432	19,972	116,014	52,029	33,391	4,150
1920	1,004,129	40,108	202,808	81,979	50,170	8,463
1921	493,280	17,111	63,331	17,052	22,595	3,241

Calendar year.	Dyewoods, diverse.		Fustic wood.		Indigo, natural.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		*Tons.*		*Pounds.*	
1917	7,565	$94,029	10,442	$289,756	2,261,122	$4,230,510
1918	15,966	407,190	11,866	280,813	1,637,914	2,007,958
1919	922	23,286	696	15,091	234,991	285,925
1920	2,653	51,904	1,304	25,033	36,537	69,528
1921	1,804	50,710	2,926	47,543	77,121	154,538

Calendar year.	Logwood.		Logwood (and other wood extracts).		Madder, ground.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		*Pounds.*		*Pounds.*	
1917	61,714	$1,509,878	736,038	$86,672	2,193	$253
1918	33,168	776,735	277,748	45,895	.....	.....
1919	29,022	549,885	539,252	62,601	7,875	1,545
1920	72,830	2,179,891	545,892	50,313	12,835	3,155
					[1] 2,300	1,340
1921	26,740	636,932	253,163	18,668	.....	.....

Calendar year.	Orchil.		Persian berries, extract.		Safflower, saffron.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
1917	.....	$50,005	.....	.....	.....	$105,516
1918	.....	56,284	.....	.....	.....	70,032
1919	372,606	42,085	5,209	$2,691	23,663	106,951
1920	547,384	58,682	11,357	3,631	21,664	127,579
1921	557,457	83,507	10,332	1,914	29,985	63,509

Calendar year.	Turmeric.		Gambier.		All other extracts of vegetable origin.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
1917	.....	$1,331	12,050,848	$1,138,833	150,078	$20,757
1918	.....	11,278	8,755,270	949,971	2,889,865	234,375
1919	1,230,220	68,852	4,744,651	432,499	443,749	80,079
1920	1,215,057	86,141	10,095,325	806,583	381,537	75,613
1921	646,182	22,775	7,022,790	269,912	564,212	40,212

[1] Extracts of madder, 1920.

TABLE II.—*General imports of coal-tar products, by countries, 1918–1921, calendar years.*

DEAD OR CREOSOTE OIL (FREE).

Imported from—	1918		1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Gallons.		*Gallons.*		*Gallons.*		*Gallons.*	
England			8,934,045	$1,085,617	12,514,150	$2,568,235	19,465,981	$3,114,867
Scotland	1,125	$862	60,756	10,462	147,377	21,096	819	139
Canada	1,543,660	161,693	2,273,578	278,138	1,619,903	277,624	374,845	64,713
All other	462	314			[1]4,145,722	979,444	13,397,787	1,576,869
Total	1,545,247	162,869	11,268,379	1,374,217	18,427,152	3,796,399	33,239,432	4,756,618

BENZOL.

	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Canada	1,315,696	$33,303	217,885	$5,617	486,619	$10,868	1,562,951	$39,020
All other							159,134	3,350
Total	1,315,696	33,303	217,885	5,617	486,619	10,868	1,722,085	42,370

CRESOL.

	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
England	3,051,833	$256,917	4,935,748	$408,407	6,037,223	$509,710	1,708,992	$139,737
Scotland	1,676,354	196,116	1,516,610	149,373	4,198,397	382,637	934,842	86,389
Canada			800	1,028	16,400	1,360	4,600	501
Germany					66,050	7,674	705,448	27,288
Total	4,728,187	453,033	6,453,158	558,808	10,318,070	901,381	3,353,882	253,896

NAPHTHALENE.

	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
United Kingdom	424,147	$13,253	1,342,091	$47,076	10,155,579	$357,954	2,644,997	$83,353
Belgium					413,274	16,972	96,928	5,412
Canada	1,328,496	44,540	1,836,478	43,795	2,959,976	78,704	1,708,868	44,541
Germany					381,740	34,135	42,683	2,383
Japan			612	42	98,695	7,653	2,320	252
Italy					494,644	17,077		
Australia			60,075	1,352	168,923	3,528		
All other					339,340	14,198		
Total	1,752,643	57,793	3,239,256	92,265	15,012,171	530,221	4,495,796	135,941

TAR AND PITCH OF COAL.

	Barrels.		*Barrels.*		*Barrels.*		*Barrels.*	
England	51	$686	600	$2,725	1,127	$4,166	7	$82
Scotland			100	256	580	3,706		
Canada	26,499	49,069	25,003	44,093	18,824	41,940	21,948	47,913
All other					150	350	13	53
Total	26,550	49,755	25,703	47,074	20,681	50,162	21,968	48,048

TOLUOL.

	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Canada			1,195,706	$30,768				

ALL OTHER CRUDES.

France		$823		$54		$10,903		$1,507
England		57,364		42,875		178,896		19,015
Scotland		825		870		1,581		
Canada		104,765		1,891		876		840
Germany						9,179		352
All other						2,886		4
Total		163,777		45,690		204,381		21,718

[1] All from Netherlands, except 6 gallons from Japan.

TABLE II.—*General imports of coal-tar products, by countries, 1918–1921, calendar years*—Continued.

CARBOLIC ACID.

Imported from—	1918				1919			
	Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, free.		Carbolic acid, dutiable (phenol).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
England	155,236	$17,260	208,037	$54,884	1,619,823	$158,820	2,061	$264
Canada			75,300	7,613				
Scotland					345,466	28,968		
Total	155,236	17,260	283,337	62,497	1,965,289	187,788	2,061	264

Imported from—	1920				1921			
	Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, free.		Carbolic acid, dutiable (phenol).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
England	178,652	$18,258	1,040	$244	205,113	$21,841	250	$142
Scotland	14,040	1,590						
Canada					9,072	1,008		
Total	192,692	19,848	1,040	244	214,185	22,849	250	142

ALL OTHER ACIDS.

Imported from—	1918		1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
England	125	$1,114	63	$374	250	$1,087		
Japan	5	2						
France					11,199	8,182		
Germany					309	500	11,263	$3,012
Total	130	1,116	63	374	11,758	9,769	11,263	3,012

ANILINE OIL.

Imported from—	1918		1919		1920		1921	
					Pounds.			
France					220	$72		

TABLE II.—*General imports of coal-tar products, by countries, 1918–1921, calendar years*—Continued.

ANILINE SALTS.

(Free under act of 1909; dutiable under act of Oct. 3, 1913, and under the act of Sept. 8, 1916.)

Imported from—	1918		1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
England	21,273	$3,250					18,301	$12,029
Germany					4	$1	15	80
Total	21,273	3,250			4	1	18,316	12,109

ALL OTHER INTERMEDIATES.

Imported from—	1918	1919	1920	1921
Belgium			$41,291	$18,774
France		$26,611	140,095	62,028
Germany			191,732	80,300
Italy			17,491	740
England	$15	48,722	302,235	98,502
Straits Settlements			41,237	
Japan	4,348	82	68,323	15
Canada		20,788		40,587
All other			29,264	40,650
Total	4,363	96,203	831,668	341,602

INDIGO.

(Free under act of October 3, 1913; dutiable under act of September 8, 1916.)

Imported from—	1918				1919			
	Indigo, natural (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Switzerland	25,762	$38,719	770,212	$410,421	15,796	$29,857	726,440	$388,067
England	264,975	463,510	6,817	5,587	10,584	16,647	1,468	1,920
British India	1,138,176	1,284,434			99,597	99,901		
Salvador	234,452	299,554			60,940	67,262	8,400	5,729
All other	83,709	108,150			40,557	46,448	87,570	36,607
Total	1,747,074	2,194,367	777,029	416,008	227,474	260,115	823,878	432,373

Imported from—	1920				1921			
	Indigo, natural (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Switzerland	57,411	$150,957	285,153	$252,708	27,386	$55,142	59,873	$101,074
England	27,289	51,556	1,229	361	9,245	9,857	6,895	5,942
Salvador	10,214	20,296			13,158	11,112		
France	50,066	70,008	400,589	172,602			331,320	87,407
Germany	4,346	5,171	25,029	18,220	882	2,382	2,829	2,288
India	2,850	7,392						
Italy			54,422	37,311			532	128
All other	48	48			1,838	7,202	6,813	8,902
Total	152,264	305,428	766,422	481,292	52,489	85,695	408,262	306,981

TABLE II.—*General imports of coal-tar products, by countries, 1918–1921, calendar years*—Continued.

ALIZARIN AND ALIZARIN DYES.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918		1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Germany					141,213	$197,562	285,007	$393,374
Switzerland	440	$572	220	$2,517	222,417	81,393	110	374
United Kingdom	4,310	3,739	23,417	21,084	25,196	18,898	44,026	54,869
Canada	1	2	215	414	297	1,806	2	5
Japan	15,141	58,948						
Belgium					46,283	32,857	13,280	9,964
Netherlands					5,906	10,314	12,483	21,582
All other	500	7,629	23	265	444	689	20,204	29,870
Total	20,392	70,890	23,875	24,280	441,756	343,519	375,112	510,038

COAL-TAR COLORS OR DYES (DUTIABLE).

Imported from—	1918, Value.	1919		1920		1921	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Pounds.		*Pounds.*		*Pounds.*	
Belgium		36,968	$63,119	190,414	$153,020	31,813	$56,481
France	$76,506	11,746	20,853	70,821	100,884	62,468	90,328
Germany		143,031	83,563	1,155,501	1,565,300	1,050,028	1,718,776
Switzerland	1,762,688	1,284,199	2,176,463	1,372,490	2,693,653	1,504,970	2,005,265
England	561,699	609,703	664,548	345,889	394,668	287,377	358,463
All other	68,546	165,750	160,730	351,758	351,277	169,699	216,035
Total	2,469,439	2,215,397	3,169,276	3,486,873	5,258,802	3,106,355	4,445,348

ALL OTHER COAL-TAR PRODUCTS.

Imported from—	1918 [1]	1919	1920	1921
France	$11,900			
Netherlands	50			
Switzerland	3,045			
England	47,548			
Mexico	32			
Total	62,575			

[1] Jan. 1–June 30, 1918.

MEDICINAL PREPARATIONS.

Imported from—	1918 [2]	1919	1920	1921
France	$32,129	$58,749	$21,724	$45,378
Germany			59,133	124,862
Italy		1,329	8	60
Netherlands		12,257	21,203	11,680
Spain		94	523	268
Switzerland	154	1,761	18,571	39,151
England	7,499	20,302	40,339	59,681
Scotland		137	87	
Canada	53,324	77,162		1
Peru	114			
Venezuela		69	7	
Japan	6,142	351	162	299
All other	10		3,816	10,229
Total	99,372	172,211	165,573	281,609

[2] July 1–Dec. 31, 1918.

TABLE II.—*General imports of coal-tar products, by countries, 1918–1921, calendar years*—Continued.

ALL OTHER FINISHED PRODUCTS.

Imported from—	1918[1]	1919	1920	1921
France	$4,162	$25,955	$37,192	$39,314
Germany			21,406	6,518
Switzerland	2,901	1,447	6,715	15,011
England	54,502	57,166	10,307	2,657
Canada	816			
All other			29	302
Total	62,381	84,568	75,649	63,802

[1] July 1–Dec. 31, 1918.

TABLE III.—*Domestic exports of coal tar and of dyes and dyestuffs, 1918–1921, calendar years.*

COAL TAR.

Exported to—	1918		1919		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		*Barrels.*		*Barrels.*		*Barrels.*	
Europe	2,039	$12,297	230	$900	243	$1,441	212	$1,394
North America	54,149	139,456	71,749	158,205	74,374	208,561	91,716	185,063
South America	808	6,288	2,759	20,166	3,725	23,650	457	3,125
Asia	198	1,505	475	3,174	10	65	17	1,857
Oceania	154	1,739	45	301	81	995		
Africa	1,176	7,435	1,334	15,757	17	49	4	43
Total	58,554	168,720	76,592	198,503	88,350	234,767	92,406	$191,482

COAL-TAR DISTILLATES, n. e. s.

BENZOL.

	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
France	32,599,682	$1,854,216	12,319,900	$407,622	2,528,494	$138,850	24,344,624	$1,095,053
Chile					229,079	16,760		
England			113,300	10,197	57,500	4,970	46,073,896	1,797,780
Germany					669,494	35,902		
Canada	136,571	7,389	335,799	21,313	389,783	23,904	44,725	287
Belgium					3,150,240	238,617		
Argentina	75,442	7,329	973,978	60,563	353,522	23,907	549,896	37,571
Japan	136,480	8,680	280,442	18,590	67,200	6,720	900	81
Italy	299,659	22,704			4,951,878	357,956	348,880	22,030
All other	46,743	4,042	215,000	16,847	707,078	79,354	667,479	54,355
Total	33,294,577	1,904,360	14,238,419	535,132	13,174,268	927,940	72,030,400	3,007,086

ALL OTHER COAL-TAR DISTILLATES.

Exported to—	1918	1919	1920	1921
	Value.	Value.	Value.	Value.
France	$2,188,439	$33,387	$445,520	$10,347
Belgium			474,793	
Italy	345,407	14,674	290,449	
England	927,295	127,583	1,632,599	28,498
Canada	1,477,984	105,335	314,641	155,917
Spain	96,798	64,917	615,284	25,334
Mexico	78,160	61,441	136,063	14,090
Brazil	72,162	101,305	193,089	32,550
Japan	475,377	250,061	1,158,196	79,745
Switzerland	46,831	8,144	1,632,599	44,833
All other	159,377	336,903	69,016	116,193
Total	5,867,830	1,103,750	6,962,249	509,508

LE III.—*Domestic exports of coal tar and of dyes and dyestuffs, 1918–1921, calendar years*—Continued.

DYES AND DYESTUFFS (VALUE).

Exported to—	Calendar years.					
	1918			1919		
	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.
gal	$176,769	$10,541	$131,280	$70,296	$2,319	$36,063
um				90	34,787	19,193
e	6,345	263,610	496,875	127,059	596,042	229,689
any				150	290	
	274,903	70,237	234,238	269,130	58,716	180,359
rlands				26,284	21,735	9,104
a			12,825	8,570		
erland	22,500	7,728	5,000	193	22,824	
d Kingdom	380,181	345,458	524,576	413,700	304,686	423,719
ia	836,445	82,292	724,522	1,015,334	119,871	1,007,892
o	289,327	5,666	181,029	467,806	17,438	230,359
al America	5,617	400	5,498	5,941	892	14,544
Indies	23,447	742	35,473	34,307	137	40,900
America	1,719,408	128,645	931,600	1,651,872	66,099	585,127
	4,248,367	504,542	2,720,399	5,565,053	48,063	1,921,202
ia	100,490	20,194	133,493	177,964	14,041	143,223
	3,993	715	15,534	45,566	1,508	8,281
ark			1,055	5,334	9,671	2,438
	518,895	104,748	472,222	535,383	18,349	84,544
n				22,694	8,584	15,708
sy		985	4,529	13,663	1,300	7,303
her	22,924	4,877	6,761	267,682	8,584	44,780
Total	8,629,611	1,551,380	6,636,099	10,724,071	1,355,936	5,004,428

Exported to—	1920			1921		
	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.
tal	$66,752	$5,970	$20,688	$1,432		
m	507,371	118,339	41,523	100,821	$6,843	$45
	807,241	607,017	391,060	67,535	66,762	8,334
ny	454	1,456	7,745	653	13,885	6,352
	582,236	404,367	275,149	45,038	8,723	70
rlands	39,682	73,472	56,057	1,938	2,535	6,590
(European)	100					
erland	132,359	60,157	92,017	20,374		19
d Kingdom	1,318,498	729,026	1,079,871	165,711	21,096	58,630
a	1,547,109	183,061	982,665	384,664	71,331	423,914
	1,091,603	11,092	210,145	149,009	3,560	132,075
d America	13,159	1,852	13,730	7,982	975	5,680
ndies	52,745	18,144	97,922	1,585	91	2,057
America	2,282,210	45,586	497,029	432,881	16,466	89,156
	12,783,303	195,493	3,208,107	3,131,071	347,610	333,709
a	277,660	41,283	134,196	207,473	13,190	51,743
	65,077	1,248	28,251	61,699	486	13,179
ark	26,463	2,903	2,794	1,305		3,849
	682,998	77,183	149,365	36,844	535	12,040
n	67,921	1,250	29,802	2,786		8,976
y	4,568	1,110	15,998	1,800		1,304
er	100,971	25,051	38,997	44,369	15,868	45,433
Total	22,450,480	2,605,060	7,373,111	5,067,000	589,756	1,203,155

TABLE IV.—*Imports and exports of inks and ink powders, 1918–1921, calendar years.*

IMPORTS FOR CONSUMPTION.

Calendar year.	Printer's ink.			Writing and copying ink.			All other, including ink powders.		
	Rate of duty.	Value.	Duty collected.	Rate of duty.	Value.	Duty collected.	Rate of duty.	Value.	Duty collected.
	Per cent.			*Per cent.*			*Per cent.*		
1918	15	$4,154	$623	15	$13,363	$2,004	15	$6,343	$951
1919	15	199	30	15	15,116	2,267	15	8,143	1,221
1920	15	15,228	2,284	15	15,505	2,326	15	10,657	1,599
1921	15	5,554	833	15	4,625	694	15	10,813	1,622

DOMESTIC EXPORTS.

Exported to—	Calendar years.							
	1918		1919		1920		1921	
	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.
Europe	$48,394	$25,371	$210,482	$68,382	$224,129	$96,699	$101,914	$71,819
North America	256,507	206,360	320,008	297,959	366,784	328,889	321,389	200,361
South America	353,023	100,833	603,758	210,212	535,265	208,272	140,612	69,336
Asia	224,345	67,736	435,664	155,420	579,843	187,988	291,719	75,867
Oceania	116,424	42,452	113,288	109,962	171,640	105,984	108,453	45,017
Africa	42,189	5,429	29,726	14,282	15,091	8,887	6,743	6,709
Total	1,040,882	448,181	1,712,926	856,217	1,892,752	936,719	970,830	449,099

SEP 2

UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 27

Emergency Tariff Act and Long-Staple Cotton

WASHINGTON
GOVERNMENT PRINTING OFFICE
1922

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FOREWORD.

This report presents a general view of the economic situation the long staple cotton industry with special reference to the effe of the emergency tariff act and to competition from foreign cotton American-Egyptian cotton, which constitutes the bulk of the d mestic growth having a staple of 1⅛ inches and over, has been treate in detail. A comparison of this cotton with the imported Egyptia has been made, and the consumption of the two kinds in the Unite States has been analyzed to show their competitive position an relative importance.

In the preparation of this report the Tariff Commission had th services of W. A. Graham Clark, special expert, and Evelina K Kean, of the textile division of the Commission's staff, and others.

SUMMARY.

The effect of the emergency tariff duty of 7 cents a pound on cotton having a staple of 1⅛ inches and over may be summarized as follows:

(1) There has been a decrease in the ratio of imports of Sakellarides cotton to total imports of Egyptian cotton, although the monthly imports of all cotton have steadily increased since the enactment of the emergency act. Prior to June, 1920, imports of Sakellarides were about 50 per cent of the total Egyptian imports, but since that time Sakellarides has averaged less than 20 per cent per month of the total imports.

(2) As shown by price tables herein, the emergency tariff has not resulted in actually increasing the price of American-Egyptian Pima cotton, although for reasons given below, it may have stabilized the price somewhat. On the other hand, the margin in Boston of Sakellarides cotton over Pima, exclusive of the duty, has steadily increased since June, 1921, largely because of the increased world demand for Sakellarides.

(3) There has been an increase in the relatively small consumption of Pima cotton in recent months on account of the growing premium of Sakellarides over Pima. This premium, however, is caused partly by the increased world price of Sakellarides and partly by the additional 7 cents duty in the American market over the ruling price in Liverpool.

THE EMERGENCY TARIFF ACT AND LONG-STAPLE COTTON.

DUTY ON RAW COTTON.

In the first United States tariff act, that of 1789, raw cotton was specifically exempted from duty. In the act of 1790 there was levied a duty of 3 cents per pound; this rate was also stated in the acts of 1816 and 1842. In the act of 1862 raw cotton was made dutiable at one-half cent a pound; in the act of 1864, at 2 cents a pound; in the act of 1865, at 5 cents a pound; and in the act of 1866, at 3 cents a pound. Raw cotton was specifically exempted from duty in the acts of 1883, 1890, 1894, 1897, 1909, and 1913.

The emergency tariff act of May 27, 1921, imposed a duty of 7 cents a pound on cotton having a staple of 1⅛ inches or more in length. Cotton less than 1⅛ inches in length remains on the free list.

In the appendix is given a table, prepared by the Bureau of Foreign and Domestic Commerce, under date of August 15, 1921, which shows the status of raw cotton in the tariff laws of the various countries of the world.

ORIGIN OF COTTON TARIFF DUTY OF 1921.

Imports of cotton in the crop year ended July 31, 1920, were abnormally large but were preceded by two years of unusually small imports. These excessive imports, particularly of Egyptian cotton, were bought in the fall of 1919 on a steadily rising market occasioned by a short American crop and a strong demand, and were due to the great boom being experienced by cotton mills, particularly tire fabric mills. These imports arrived mainly in the early part of 1920. Shortly thereafter there was a sharp reaction, resulting from the inability of the general public to pay the high prices demanded for goods made from cotton bought at peak values. The mills using imported cotton were left with large stocks of high-priced cotton which they could not manufacture at a profit and several failed, including one very large tire fabric company. The decline in prices during the summer and fall of 1920 was sharp and continuous.

In the meantime the cotton growers of the Southwest, planting at the time of high prices in the spring of 1920, greatly increased their acreage and that fall picked 92,561 bales of cotton as compared with 40,437 bales the previous year. When this cotton was put on the market there was practically no demand, inasmuch as the mills had large surplus stocks of Egyptian cotton and in most cases were operating short time or else were shut down. Being unable to market their crop, from which they had anticipated large profits, at a price that would repay them the cost of production, the growers of cotton in the Southwest made request for a duty on competitive cotton

Texas has long been the main cotton-producing State. In the 1920–21 season it was followed by South Carolina, Georgia, Oklahoma, Arkansas, North Carolina, Mississippi, Alabama, Louisiana, and Tennessee in the order named. Smaller producers were Arizona, Missouri, California, and Virginia.

Cotton under 1⅛ inches is classed commercially as short staple, whereas cotton having a staple of 1⅛ inches or more is classed as long staple. The Bureau of Crop Estimates of the United States Department of Agriculture estimated the domestic production in he 1920–21 season, according to length of cotton lint, as follows:

	Bales of equivalent 500 pounds.	Per cent.
Short-staple uplands, under 1⅛ inches	12,049,000	90.2
Long-staple cotton, 1⅛ to 1½ inches	1,112,000	8.3
Long-staple cotton, over 1½ inches	[1] 205,000	1.5
Total	13,366,000	100.0

[1] The amount included having a staple of 1⅜ inches or over is not known, but probably did not exceed 50,000 bales.

In addition to the ordinary short-staple upland cotton, which in 1920–21 constituted 90.2 per cent of the domestic crop, the United States produces long-staple uplands, American-Egyptian, and sea-island cotton. The long-staple uplands are 1⅛ to 1⅜ inches in length of staple (a trifle of "extra" or "fancy" staple attaining lengths up to 1⅜ inches); they are of the same species as the short-staple uplands, although it is possible that some of the longest have been slightly crossed with sea island. The cultivation of these long-staple uplands is mainly confined to the Mississippi delta and the lowlands of Louisiana.

The production of sea island in 1916 amounted to 93,000 bales, but the spread of the boll weevil has reduced the crop to negligible proportions, only 1,440 bales of equivalent 500 pounds having been grown in 1920.

The domestic cotton that is most similar to the imported Egyptian and which comes in most direct competition therewith is the American-Egyptian cotton grown in the Southwest.

PRODUCTION OF AMERICAN-EGYPTIAN COTTON.

The production in the United States of acclimated Egyptian cotton is a comparatively recent development. Several varieties of Egyptian cotton were imported into the United States in 1901 and used as a basis of plant breeding work. In 1908 a "sport" in the Mitafifi was noted and propagated. The name "Yuma" was given to this variety. In the spring of 1912 the United States Department of Agriculture distributed selected Yuma seed to a number of farmers in the irrigated sections of the Southwest, including the Salt River Valley in Arizona and the Imperial Valley in California. Yuma was grown in a small way until 1917, when it was displaced by Pima, a variety evolved from a single Yuma plant with improved and more desirable characteristics. The plant was selected in 1911 and carefully tested during the next four years. Its superiority was so clearly

established that in the spring of 1917 a supply of Pima seed sufficient to plant 275 acres was furnished a group of farmers near Tempe, Ariz., and from this acreage a supply of pure seed was produced with which to plant the entire cotton acreage of the Salt River Valley in 1917. This one variety has been grown in that valley exclusively since that time. The purity of the variety has been maintained by separate ginning and careful field inspection.

The production of American-Egyptian cotton, from its beginning on a commercial scale, is given in the following table:

TABLE 3.—*Production of American-Egyptian cotton.*

Crop years ended July 31—	Equivalent 500-pound bales.	Crop years ended July 31—	Equivalent 500-pound bales.
1912	375	1917	13,989
1913	2,135	1918	[1] 26,187
1914	6,187	1919	[1] 40,637
1915	1,095	1920	[1] 92,303
1916	3,331	1921	[1] 37,094

[1] Running bales of approximately 500 pounds.

The production of American-Egyptian cotton is confined almost entirely to the one county of Maricopa, in the Salt River Valley, Ariz., where the soil and climatic conditions closely approximate those of Egypt and where the necessary moisture must be supplied by irrigation. Pima is the only cotton grown in the Salt River Valley. It is grown only to a slight extent elsewhere; possibly 500 bales are produced annually in the Imperial Valley in California. Most of the cotton grown in Arizona outside of Maricopa County, and in the Imperial Valley (which extends across the border from California to California Baja, Mexico), consists of Durango or of upland varieties which rarely exceed 1¼ inches in length of staple.

American-Egyptian or "Pima" cotton requires a growing season of 275 to 300 days between frosts, whereas upland cotton can be grown safely in 225 days. Upland cotton up to $1\frac{5}{16}$ inches can be ginned on saw gins, whereas the Pima, being longer, must be ginned on the slower roller gins. The lint of both types is marketed in the same kind of bales, and the seed of both types is manufactured in the same way. The production costs are approximately the same for the two types, but the harvesting costs are nearly twice as much for Pima as for upland, because a cotton picker will gather from 125 to 175 pounds per day of upland seed cotton as compared with 60 to 100 pounds per day of Pima cotton. On the other hand, the Pima cotton brings a much higher price on the market, usually about double that of the upland.

Arizona has not been affected by the boll weevil which has ravaged such a large part of the cotton belt, nor has the pink bollworm made its appearance, although it has been found in Louisiana and Texas. Immunity from these pests is due largely to the measures used by the State horticultural commission in requiring a rigid inspection of all cotton seed entering the State.

Accurate data as to the cost of production of Pima cotton are not available. Mr. Dwight B. Heard, president of the Arizona Pima-

otton Growers' Association, in his testimony before the Senate inance Committee in December, 1921, stated:

My impression is that at this price of 35 cents we can lay it down in New England -day and make a fair return to the farmer on his land, and that is about as low as we uld do it. We may get it down to 30 cents.[4]

The freight rate in 1922 on cotton from Arizona to Boston is uoted as follows:

	Until June 30 (per 100 pounds).	Effective July 1 (per 100 pounds).
Cotton in bales, compressed to density of 22½ pounds per cubic foot (minimum carload weight, 37,500 pounds)	$1.69½	$1.88½
Cotton in bales, to be compressed in transit to 22½ pounds per cubic foot (minimum carload weight, 37,500 pounds)	1.87½	2.08½
Cotton in uncompressed bales (minimum carload weight, 20,000 pounds)	2.20	2.44

Disregarding the rate on uncompressed bales, it will be seen that the freight rate from Arizona to Boston is about 1¾ cents a pound until July, 1922, and in July will be advanced to about 2 cents per pound. This compares with a transit cost (freight, marine insurance, and fumigation) on Egyptian cotton to the same point of about 1¼ cents a pound, giving Egyptian cotton a differential of about one-half of a cent a pound.

THE EGYPTIAN COTTON CROP.

Cotton is the main crop grown in Egypt. Consul Maynard estimates that cotton and its by-products are responsible for 90 per cent of the economic life of the country. Cotton constitutes the only article of importance that Egypt has to offer in international trade. It represents over 80 per cent of the exports of Egypt, to which must be added cotton seed, and cottonseed cake and oil. The principal imports are cotton goods,[5] mainly manufactured in England from American cotton, but the power to buy them depends upon the price realized from the sale of Egyptian cotton.

Cotton growing in Egypt is a development of the past 100 years, dating from 1820. Inaugurated with imported sea-island and Brazilian seed, the result of crossbreeding and of special conditions of soil and climate has been the establishment of a distinctively Egyptian type of cotton, of which, however, there are many varieties. The predominant type changes from time to time. A new variety is developed from a "sport" or special crossbreeding and may become of such importance as to overshadow all others. Cross-pollenization in the fields with other varieties or with "Hindi" (an inferior cotton

[4] The Daily News Record, in its issue of Jan. 19, 1922, printed a special from Phoenix, Ariz., in regard to cotton conditions in the Salt River Valley. The following statements are of interest:

"While the valley has been through a trying period, the farmers still have faith in cotton, as demonstrated by the increase in cotton acreage for the coming year. A conservative estimate gives the acreage next year as 85,000 while there are many who predict cotton will be planted in 100,000 acres.

"'Cotton bringing 30 cents is more profitable than an other farm product,' declares J. D. Taylor, president of the Martin Cotton Co., in reviewing the local situation. 'The farmers can make a better living out of cotton than by diversified farming. I do not mean the automobile farmer, but the real farmer who operates his farm, who makes from half a bale to a bale an acre.'"

[5] Egypt is an important importer of cotton goods, normally ranking sixth, and being exceeded only by India, China, Turkey, Dutch East Indies, and Argentina. Consuls report that the foothold secured by American cotton goods during the World War is menaced by the resentment of the population at the duty on their cotton that is now levied by the United States.

of unknown origin), the mixing of cotton before ginning, and the lack of care in maintaining the purity of seed at the gins, prevent the maintenance of such pure bred or carefully selected strains and make it easy for any new variety that shows an improvement to take the lead. Varieties such as Gallini, Bamia, Hamouli, and Abyad, which were once prominent, are now entirely extinct. For a considerable period prior to the war the predominant type was the Mitafifi; Abbassi and Joannovich were also well known, but these have in the course of recent years almost disappeared. Sakellarides, which originated about 1907, now constitutes over one-half of the crop, and Ashmouni and Zagora are the only other varieties of commercial importance. In 1921, of 1,291,878 feddans (1 feddan is 1.038 acres, practically 1 acre) of land planted to cotton in Egypt, 1,012,350 feddans (of which all but 28,583 feddans were under Sakellarides) were in lower Egypt, the delta north of Cairo, and 279,528 feddans (of which 169,689 feddans were under Ashmouni and 89,665 feddans under Zagora) were in upper Egypt, extending along the Nile south of Cairo. Sakellarides is the highest type of cotton yet developed in Egypt, and once started it proved so profitable, owing to the longer staple, which brings a higher price, that it was quickly adopted throughout the delta. The cottons grown in upper Egypt, and known as "Egyptian uppers," are more productive per acre and give a larger yield of lint per pound of seed cotton, but are shorter in staple and hence command a much lower price on the market. The Sakellarides varies in length from $1\frac{5}{16}$ to $1\frac{1}{2}$ inches, and the uppers from $1\frac{3}{16}$ to $1\frac{5}{16}$ inches. The greater part of the Sakellarides imported into the United States is about $1\frac{7}{16}$ inches and the uppers $1\frac{3}{16}$ inches in length.

Egypt is a small country and the total cultivable area to-day is only about 5,500,000 acres, as compared with the 700,000 square miles (about 448,000,000 acres) of the Southern Cotton Belt having a climate suitable for cotton. As Egypt is an almost rainless country, cotton is grown entirely by irrigation and its extension is limited by the amount of water available from the Nile. Efforts have been made by the erection of the Assouan and other dams to conserve and distribute the water supply to the best advantage. Other dams and reservoirs will doubtless be provided in the future, but even with the fullest utilization of the available water it is hardly probably that the area that can be planted to cotton will ever exceed 4,000,000 acres. The acreage in cotton has been extended as more water became available for irrigation, but owing to lack of artificial fertilization or other cause it may be noted that the yield per acre has been declining for a long time. In 1897, for instance, there was attained an average production of 580 pounds per acre, whereas in 1921 the average was reduced to only 255 pounds per acre. The Egyptian Government is able to exercise direct control over the acreage and the kind of seed to be planted in Egypt. Owing to the low price received for the 1920 crop, the Egyptian Government decreed that not more than one-third of any holding should be planted in cotton, and the cotton acreage of 1921 was thereby reduced about 28 per cent. This decree is to remain in force throughout 1922 and 1923, unless the Egyptian Government finds that conditions have so changed as to make restriction of acreage no longer advisable.

There is one small cotton mill in Egypt and some home manufacre, but the great bulk of the crop is exported. Egyptian official atistics record exports of cotton in bales for the crop years ended ne 30, 1913–1921, as follows:

TABLE 4.—*Export of cotton from Egypt.*

Exported to—	1913	1914	1915	1916	1917	1918	1919	1920	1921
	Bales.	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*
ngland	426,853	437,820	367,774	350,144	346,196	503,597	459,774	410,923	192,190
nited States	124,634	89,723	176,974	185,497	134,891	75,865	95,202	275,617	46,423
rance	87,014	88,033	24,412	42,390	28,063	35,819	69,620	54,593	35,757
ermany	77,177	99,943	.....	.....	.....	.....	.....	6,431	18,634
ustria	53,573	52,094	.....	.....	.....	.....	.....	1,426	2,935
ussia	75,740	78,556	45,109	45,834	42,446	.....	.....	.....	.....
witzerland	36,609	35,309	111,436	18,193	19,456	8,741	23,201	12,514	26,139
aly	36,528	35,948	59,537	37,934	35,270	140	34,994	38,320	19,320
pain	21,356	20,391	17,353	25,728	20,682	18,218	22,160	16,368	16,136
Total	958,883	970,263	832,721	728,319	630,610	714,182	718,309	832,795	379,842

The foregoing figures represent running bales; these average about 738 pounds net, which with 22 pounds tare is equivalent to 760 pounds gross.

England is the main market for Egyptian cotton, taking over half of the total crop and a much larger proportion of the best grades. During the past decade the requirements of the rapidly expanding tire-fabric industry in the United States have caused this country to become the second largest buyer of Egyptian cotton. The imports of the United States are slightly larger than shown in Table 4, as a portion of the American purchases has been made through England; such indirect shipments have, however, become rarer, and practically all cotton for the United States is now shipped direct from Alexandria.

A report by Mr. Lester Maynard, United States consul at Alexandria, Egypt, forwarded July 27, 1921, gives careful, detailed estimates of the cost of production of Egyptian cotton. He arrived at the conclusion that the cost of producing a cantar of cotton delivered to steamer in Alexandria, but not including commissions and profits of factors, was P. T. 562.[6] This is 562 multiplied by $0.04991 divided by 99.0436, or 28.32 cents a pound at normal rates of exchange. With exchange at 90 per cent of par it is equal to 25.49 cents a pound.

The freight rate on cotton from Alexandria to Boston or New York in April, 1922, was 40 shillings for 2 bales not exceeding 40 cubic feet; in practice this is equal to 20 shillings per bale of 738 pounds net. This is equal to 0.6594 cent per pound at normal exchange or 0.5935 cent per pound, if exchange be at 90 per cent of normal. It is stated that this freight rate will probably be increased to 30 shillings, an increase of 50 per cent, in August of 1922.

The marine insurance on the above is 10s. 6d. per £100, or 0.525 of 1 per cent. If the cotton be valued at 40 cents a pound, then the marine insurance is equal to 0.21 of a cent a pound.

The fumigation charges, to which all Egyptian cotton is subjected on entry into the United States, are $3 per bale, and if the bale be 738 pounds net, this is equal to 0.4065 of a cent a pound.

[6] The Egyptian pound is composed of 100 P. T. or piasters tarif. The English pound sterling (normal value of $4.8665) is equal to 97½ P. T., therefore 1 P. T. is equivalent at normal exchange to 4.991 cents U. S. If exchange be at 90 per cent of normal then 1 P. T. equals 0.90 multiplied by 4.991 or 4.492 cents U. S. The cantar is stated by Consul Maynard as 99.0436 pounds, and by the United States Department of Commerce as 99.0492 pounds. In commercial transactions it is usually taken as 99.05 pounds.

The freight and marine insurance from Alexandria, Egypt, to Boston, in March, 1922, together with the fumigation charges, therefore amount to 0.5935 plus 0.21 plus 0.4065, or 1.21 cents a pound. Importers state that, allowing for handling and their other expenses and profits in addition to the above, imported Egyptian cotton costs the purchaser at Boston about 2½ cents a pound above the Alexandria price.

RELATIVE GRADES OF PIMA AND SAKELLARIDES.

American-Egyptian cotton until 1917 was mainly of the Yuma variety and was classified as fancy, extra, choice, standard, and medium. With the substitution of the Pima variety the United States Department of Agriculture introduced a number classification and American-Egyptian cotton is now sold as Pima Nos. 1, 2, 3, 4, and 5. No. 1 is the best and No. 5 the lowest grade.

Egyptian cotton is classified as extra fine, fine, good, fully good fair, good fair, and fair, in descending order. During the war the prices of Egyptian cotton were officially fixed by the British Cotton Control Commission, and in order to secure a correct graduation of values, it substituted type numbers which took into account not only the grade of each variety but also the staple. These type numbers are shown, with grades and 1918 official prices, in the appendix, from which it will be seen that Nos. 1 to 23 were assigned to upper Egyptian cotton, Nos. 30 to 58 to Sakellarides, and Nos. 70 to 127 to brown Egyptian. Since the war there has been a reversion to the former system, but the tendency is for the gradual substitution of the type numbers because of the more accurate grade and staple classification thereby secured. The official classification of 1918 serves to bring out the fact that for any type of Egyptian cotton, say Sakellarides, there is a wide range of prices at any particular time. Both Sakellarides and Pima are particular types of Egyptian cotton, the relative market prices of which can be secured only by comparing corresponding grades.

The United States Department of Agriculture gives the equivalents of the Pima grades in Egyptian cotton, corresponding to the official cotton standards of the United States in leaf only, as follows:

American-Egyptian No. 1 equivalent to extra fine Sakellarides No. 2, fine; No. 3, good; No. 4, fully good fair to good fair; No. 5, strictly good fair.

One of the leading importers of Egyptian cotton comments on this comparison as follows:

> We have your favor of April 7 giving the Bureau of Markets comparison of American Egyptian and imported Egyptian cotton. This differs from our comparison because ours takes into consideration the comparative spinning values, whereas the Bureau of Markets considers only the amount of leaf and other foreign matter in the grades of the two growths. The just comparison is one which will produce the same results, equivalent, rather than two types which carry the same amount of leaf. This is brought out in price. We have recently sold fully good fair Egyptian Sakellarides (which the Bureau of Markets considers equivalent to No. 4 American-Egyptian) at 45 cents landed New England mill points, tariff paid. On the same day we were offering No. 4 Government standard American-Egyptian at 32 cents.

The following is our comparison:

American-Egyptian No. 1 equivalent to fully good fair Sakellarides; No. 2 equivalent to good fair to fully good fair; No. 3 equivalent to good fair; No. 4 equivalent to fully fair to good fair; and No. 5 equivalent to fully fair.

In the lower grades we believe the depreciation is less in American-Egyptian than in imported Egyptian. This also shows in the price. The low grade American-Egyptian and the low-grade imported Egyptian with the duty added are much nearer together than the high grades of the same. There is also a wider price variation between grades on the imported Egyptian than on the American-Egyptian, and for this reason we consider one-half grade in the imported Egyptian as equal to full grade in the American in our comparison.

Another importer states:

We think that Egyptian Sakellarides No. 38 (fully good fair to good, extra fine staple) is equivalent to Pima No. 1; CCC No. 42 (fully good fair, extra staple) to Pima No. 2; and CCC No. 46 (good fair to fully good fair, medium staple) to Pima No. 3.

A third importer of importance states:

Fully good fair Sakellarides corresponds to Pima No. 2 in grade, but the Pima will not do the work of Sakellarides of the same grade, particularly in high count yarns. Pima No. 1 corresponds approximately to good Sakellarides and the difference between fully good fair and good is normally 9½ cents a pound. This is the difference which was established by the Cotton Control Commission of Egypt in 1918. Pima No. 3 corresponds in grade to good fair Sakellarides, which sells normally for 3½ cents a pound less than fully good fair.

IMPORTS OF RAW COTTON.

Imports of raw cotton into the United States, by countries of production, are recorded by the United States Department of Commerce as follows:

TABLE 5.—*Imports of foreign cotton.*

[Equivalent 500-pound bales.]

Season ended—	Total.	Produced in—					All other.
		Egypt.	Mexico.	China.	Peru.	India.	
Aug. 31, 1913	227,645	191,075	756	18,341	10,737	4,373	2,363
July 31, 1914	260,988	138,579	80,285	20,772	12,627	7,849	876
July 31, 1915	382,286	252,373	85,180	25,631	10,353	7,845	904
July 31, 1916	437,574	350,796	30,098	35,792	10,909	4,214	5,765
July 31, 1917	291,957	199,892	32,858	36,063	11,069	3,860	8,215
July 31, 1918	221,216	114,580	35,726	38,964	19,692	7,096	5,158
July 31, 1919	201,585	100,006	54,434	10,871	25,230	2,893	8,151
July 31, 1920	700,214	485,004	65,343	57,185	63,426	14,358	14,898
July 31, 1921	226,341	87,168	88,155	14,722	22,597	8,489	5,210
Average 9 years	327,756	213,275	52,537	28,705	20,737	6,775	5,727

Subsequent imports by months have been as follows:

TABLE 5a.—*Imports of foreign cotton.*

[Equivalent 500-pound bales.]

Months ended—	Total.	Produced in—					All other.
		Egypt.	Mexico.	China.	Peru.	India.	
1921.							
August	5,631	4,728	.....	306	73	494	30
September	6,361	3,396	300	.....	928	935	802
October	31,269	18,972	5,531	41	5,303	962	460
November	51,440	27,126	15,257	.....	7,855	333	869
December	61,006	41,224	11,847	.....	5,550	514	1,871
1922.							
January	42,093	25,929	10,034	1,383	3,779	66	902
February	55,024	36,242	7,246	4,564	6,392	70	510
March	59,958	47,636	3,123	4,532	2,246	784	1,637

In spite of its enormous surplus production of cotton the United States finds it necessary to import certain varieties from abroad. These cottons of special characteristics are supplementary rather than competitive, and in general are higher in price than the domestic.

The cottons imported into the United States may be classed, in order of relative importance, as (1) Egyptian, (2) Mexican, (3) Chinese and Indian, (4) Peruvian, and (5) all other, including West Indian and Brazilian.

(1) Egyptian cotton constitutes approximately two-thirds of our imports of foreign cotton. As previously shown, the term "Egyptian cotton" covers a wide range of staples and grades. The Sakellarides variety, about $1\frac{7}{16}$ inches in length of staple, is the one that is dutiable under the emergency tariff act, whereas Egyptian "uppers" (which term includes both Ashmouni and Zagora, as well as a trifle of Mitafifi and other varieties) are not dutiable as they are shorter, usually about $1\frac{3}{16}$ inches in length. Before the imposition of a duty on cotton of $1\frac{3}{8}$ inches and longer, Sakellarides constituted nearly half of the total Egyptian imported; it has since declined in relative importance, in some months constituting less than 10 per cent of the total Egyptian imported. Sakellarides is a very high-class cotton, silky and soft but exceptionally strong, and can be spun to very fine counts; it is creamy white in color and unexcelled in its mercerization properties.

Over one-half of the Egyptian cotton imported is used in making tire fabrics. One of the largest importers states that the tire-fabric industry uses Ashmouni (known as uppers), medium grades, staple $1\frac{3}{16}$ inches; Sakellarides, medium grades, staple $1\frac{7}{16}$ to $1\frac{1}{2}$ inches; Sakellarides, medium grades, staple $1\frac{5}{16}$ to $1\frac{3}{8}$ inches; Mitafifi, medium grades, staple $1\frac{1}{4}$ to $1\frac{5}{16}$ inches (small quantities).

He states that other spinners, mainly manufacturers of sewing thread, use Sakellarides; high grades, staple $1\frac{7}{16}$ to $1\frac{1}{2}$ inches; Sakellarides, high grades, staple $1\frac{5}{16}$ to $1\frac{3}{8}$ inches; Ashmouni, medium grades, staple about $1\frac{3}{16}$ inches.

(2) The Mexican cotton imported is nearest to the American in its characteristics and is upland cotton of good staple, mainly $1\frac{1}{8}$ to $1\frac{5}{16}$ inches, and is grown in the Imperial Valley in California Baja.

Much of this cotton is imported in the seed for ginning in the United States. On moving across the line through the Mexican customs at Mexicali, there is levied on baled lint or seed cotton an export tax of 15 pesos per 1,000 kilos (equivalent to 3.39 cents per pound with the peso at par value). This cotton enters at Calexico, Calif., the only border point at which cotton is permitted entry into the United States. The Federal Horticultural Board of the United States Department of Agriculture has a representative at Calexico to supervise imports with a view to preventing the introduction of dangerous insect pests; he inspects the cotton fields of California Baja and issues permits for the importation of Mexican-grown cotton into the United States.

(3) The Chinese cotton imported is mainly a variety that grows wild in the district of Prong Tan Fou, outside of Tientsin; it is rough and curly, with a staple of five-eighths to seven-eighths inches. The Indian cotton imported comes from the Province of Assam, being exported through Calcutta; it has a staple or five-eighths to three-fourths inches, is very rough in texture, and so brittle that it is rarely spun alone. The Chinese cotton, either alone or mixed with the Indian, is used as filling in the manufacture of cotton blankets. These rough cottons possess certain springy or elastic properties not found in American cultivated cottons and give an exceptionally nappy surface, so that blankets made therewith are particularly sought by consumers.

(4) Cotton grown in Peru includes three distinct types; (1) Mitafifi and Tangüis, (2) rough Peruvian, and (3) smooth Peruvian. Mitafifi and Tangüis, grown from Eygptian seed, now constitute the bulk of our imports of Peruvian cotton, being used to mix with or substitute for Egyptian grown varieties. The staple runs from $1\frac{3}{16}$ to $1\frac{7}{16}$ inches. Rough Peruvian is the indigenous tree cotton that is grown by irrigation in the Department of Piura, in northern Peru; it has a strong, rough, woolly, crinkly staple of $1\frac{1}{4}$ to $1\frac{3}{8}$ inches. It is very similar to wool in its characteristics and is used as a substitute therefor, being sometimes called vegetable wool. Its price depends more on the price of wool and the supply of rough Peruvian than upon the price of other cottons. American imports of rough Peruvian are used in the manufacture of white flannels and in merino (wool-and-cotton) yarns for hosiery and underwear. Smooth Peruvian is grown from American upland seed, and the staple is $1\frac{1}{8}$ to $1\frac{1}{4}$ inches. This variety is used in Peruvian mills; imports into the United States are very small.

Under the provisions of the plant quarantine act of August 20, 1912 (37 Stat. 315), the Secretary of Agriculture, on April 27, 1915, issued an order restricting the importation of cotton into the United States. This order, as revised July 18, 1917, is now (1922) in force. Importers must secure permits from the Federal Horticultural Board and, with the exception of the regulations in regard to the import of Mexican cotton through Calexico, as noted, foreign cotton can be brought in only at the ports of Boston, New York, Seattle, and San Francisco, where there are fumigating stations. All imported cotton must now be disinfected, except that from California Baja, and American cotton in original containers, when it can be clearly shown that this latter cotton has been grown in regions not under restriction

on account of the presence of the pink bollworm. The Federal Horticultural Board not only follows the cotton through to the mill, but requires that mills using such foreign cotton shall secure licenses and shall guarantee to screen their warehouses, burn daily their picker-room motes, and use all precautions to prevent the escape of the pink boll-worm and other insects.

AMERICAN CONSUMPTION OF COTTON OF 1⅛ INCHES AND OVER.

There are no exact figures as to the production and consumption of cotton of 1⅛ inches and over. Prior to the crop of 1917 the bulk of the domestic production of such cotton consisted of sea island; since then it has consisted mainly of American-Egyptian or "Pima" cotton. In the crop year ended July 31, 1920, the Arizona Pima production amounted to 92,561 bales of equivalent 500 pounds, and about 500 bales of the same type were raised in California. Mississippi and South Carolina possibly accounted for 3,000 bales each of upland and sea island cotton of this staple. Allowing for a trifle in other States it is probable that the domestic production of cotton of 1⅛ inches and over amounted in that year to 100,000 bales. In the crop year ended July 31, 1921, the production of Pima was only 37,094 bales, and allowing for the production of sea island and long-staple uplands it is probable that the total domestic production of cotton of 1⅛ inches and over did not exceed 45,000 bales of equivalent 500 pounds.

Importers estimate that prior to the enactment of the emergency tariff act imports of Egyptian cotton contained 40 to 50 per cent of cotton of 1⅛ inches or over; in addition there was a small import of cotton of such length from other countries, such as Peru and the West Indies. Imports of cotton of this length may be estimated as normally about 100,000 bales of equivalent 500 pounds a year; in the crop year ended July 31, 1920, running up to a record of approximately 200,000 bales, or a two years' supply.

The American consumption of cotton of 1⅛-inch staple and over has probably never exceeded 150,000 bales of equivalent 500 pounds a year, and normally is probably not much over 100,000 bales a year.

If the preceding estimates are even approximately correct it is evident that both production and imports of such extra-long staple cotton in the crop year ended July 31, 1920, were abnormal, and that the 1920 surplus of such cotton above the possible consumption of mills fitted to spin such staple was necessarily a matter of slow disposal.

AMERICAN CONSUMPTION OF EGYPTIAN AND AMERICAN-EGYPTIAN COTTON.

The following data, compiled by the Bureau of the Census, show by months the domestic mill consumption of imported Egyptian cotton of all kinds during the past seven crop years, and of American-Egyptian cotton during the past two crop years. The American-Egyptian or Pima cotton is all of 1⅛ inches or more, whereas less than half of the imported Egyptian cotton is of this length.

TABLE 6.—*American mill consumption of Egyptian and of American-Egyptian cotton.*

[Crop year ended July 31.]

Month.	Egyptian cotton (equivalent 500-pound bales.)							American-Egyptian cotton (running bales).[1]	
	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1920–21	1921–22
August	18,853	21,246	17,175	7,895	15,865	26,682	20,263	2,549	2,239
September	20,484	20,404	13,433	7,470	16,392	19,581	15,895	1,590	2,158
October	22,144	23,144	14,895	7,829	22,079	12,867	18,891	1,194	2,277
November	23,870	24,060	14,745	7,182	20,261	10,236	22,291	771	2,557
December	25,963	21,034	11,751	10,331	24,989	7,219	20,779	887	3,240
January	24,793	24,622	11,194	12,889	28,173	7,180	20,783	389	4,030
February	23,008	21,336	10,407	11,108	24,804	7,600	19,908	836	3,759
March	27,074	23,210	10,618	11,217	31,578	9,705	20,379	947	4,286
April	20,330	20,086	8,047	13,513	34,933	12,198	.....	1,337	.....
May	21,658	22,760	9,187	11,376	33,606	14,765	.....	1,838	.....
June	22,350	19,680	7,634	12,413	37,511	15,446	.....	1,962	.....
July	18,797	17,579	7,315	13,404	32,933	15,717	.....	2,471	.....
Total	269,324	259,161	136,401	126,089	323,124	159,196	159,189	16,771	24,546

[1] Of approximately 500 pounds each.

The census figures do not differentiate between the various types of Egyptian cotton, such as the extra-long staple Sakellarides and the shorter staple "uppers." They show that the consumption of Egyptian cotton of all kinds was abnormally large during the crop year 1919–20, that it declined to less than half this abnormal figure in the crop year 1920–21, and that in the crop year 1921–22 it is again increasing to its normal status of something over 200,000 bales of equivalent 500 pounds. The large consumption in 1920 and subsequent decline and recovery have no tariff significance, but result from trade conditions in the American cotton industry, particularly in the tire-fabric and sewing-thread branches. The lowest prices for Egyptian cotton during this period were during the summer of 1921 when imports were smallest.

It is seen from Table 6 that the consumption of Pima cotton is much smaller than that of imported Egyptian. In the crop year 1920–21 the consumption of Pima was less than 11 per cent, and in the first eight months of the crop year 1921–22 less than 15 per cent of the consumption of Egyptian. It shows that the relatively small consumption of Pima has, during the past year, been increasing faster than the consumption of Egyptian; this is said to be due to the very much lower price at which Pima could be bought, as compared with imported Sakellarides, since the passage of the emergency tariff act. The consumption of Pima attained the record of 4,286 bales during the month of March, 1922, allowing for the fact that less than half of the Egyptian used is Sakellarides, this probably represents more than a third of the quantity of cotton of 1⅛ inches and over that was consumed in this country during that month.

TABLE 7.—*Consumption of Egyptian and American-Egyptian cotton in the United States, by geographic divisions.*

Month.	Egyptian cotton, in 500-pound bales.						
	Total.	Massachusetts.	Rhode Island.	Other New England States.	Total New England States.	Southern States.	All other States.
1920.							
August	26,682	17,386	3,113	2,494	22,993	2,083	1,606
September	19,581	11,477	3,467	1,766	16,710	1,813	1,058
October	12,867	5,832	2,651	1,682	10,165	1,435	1,267
November	10,236	4,043	2,895	1,110	8,048	1,235	953
December	7,219	2,803	1,320	905	5,028	957	1,234
1921.							
January	7,680	4,249	1,146	745	6,140	676	864
February	7,100	3,316	1,364	742	5,422	682	996
March	9,705	3,467	2,947	900	7,314	1,317	1,074
April	12,198	5,079	3,596	838	9,513	1,524	1,161
May	14,765	7,404	2,936	1,118	11,458	1,896	1,411
June	15,446	7,959	2,287	1,666	11,912	2,187	1,347
July	15,717	8,227	2,874	1,341	12,442	1,951	1,324
12 months	159,196	81,242	30,596	15,307	127,145	17,756	14,295
Per cent	100.00				79.87	11.15	8.98
1921.							
August	20,263	10,331	3,634	1,749	15,714	2,722	1,827
September	15,895	7,961	2,342	1,655	11,958	2,200	1,737
October	18,891	9,844	2,727	1,813	14,384	2,661	1,846
November	22,291	11,819	3,421	1,666	16,906	3,780	1,605
December	20,779	10,784	3,510	1,656	15,950	3,105	1,724
1922.							
January	20,783	11,844	3,005	1,649	16,558	2,558	1,667
February	19,908	10,814	2,732	1,538	15,084	3,043	1,781
March	20,379	10,093	2,785	1,628	14,506	3,846	2,027
8 months	159,189	83,490	24,216	13,354	121,060	23,915	14,214
Per cent	100.00				76.05	15.02	8.93

Month.	American-Egyptian cotton, in running bales.[1]						
	Total.	Massachusetts.	Rhode Island.	Other New England States.	Total New England States.	Southern States.	All other States.
1920.							
August	2,549	1,082	176	197	1,455	639	455
September	1,590	332	47	219	598	541	451
October	1,194	119	27	247	393	300	501
November	771	41	23	201	265	111	395
December	887	45	48	172	265	71	551
1921.							
January	389	43	1	137	181	41	167
February	836	172	3	111	286	320	230
March	947	204	2	73	279	480	188
April	1,337	260	6	134	400	654	283
May	1,838	613	67	150	830	633	375
June	1,962	474	278	107	859	684	419
July	2,471	946	154	67	1,117	772	582
12 months	16,771	4,331	782	1,815	6,928	5,246	4,597
Per cent	100.00				41.31	31.28	27.41
1921.							
August	2,239	609	60	171	900	575	764
September	2,158	724	274	368	1,366	154	638
October	2,277	550	324	487	1,361	180	736
November	2,557	552	509	495	1,556	231	770
December	3,240	1,244	510	522	2,276	84	880
1922.							
January	4,030	1,307	891	597	2,795	398	837
February	3,759	1,257	724	570	2,551	335	873
March	4,286	1,784	340	668	2,792	404	1,090
8 months	24,546	8,087	3,632	3,878	15,597	2,361	6,588
Per cent	100.00				63.54	9.62	26.84

[1] Of approximately 500 pounds each.

Mill consumption, by geographic divisions.—Table 7 herewith has been prepared from an analysis of the original Census records, to show the consnmption of Egyptian cotton (including all varieties), and of Americau-Egyptian cotton, by geographic divisions.

The figures from January to March of the present year (1922) are compiled from the preliminary figures of the Census Bureau and are therefore subject to some modification.

The New England States include Massachusetts, Rhode Island, Connecticut, Maine, and New Hampshire; the Southern States include Georgia, North Carolina, South Carolina, and Maryland; "all other States" include New York, New Jersey, California, Ohio, Illinois, etc.

Massachusetts is the largest consumer of both Egyptian and American-Egyptian cotton; the consumption by other individual States is, with the exception of Rhode Island, not shown separately as the figures might possibly disclose the operations of particular mills.

The consumption of Egyptian cotton in the eight months ended March 31, 1922, was almost identical with that for the 12 months ended July 31, 1921, which shows that the mills are recovering from the 1921 depression and getting back to normal conditions. In both periods Massachusetts accounted for somewhat over half, and New England for somewhat over three-fourths, of the total Egyptian used. The relative consumption of New England slightly decreased and that of the Southern States slightly increased.

The consumption of Pima cotton increased from 16,771 bales in the crop year ended July 31, 1921, to 24,546 bales in the eight months ended March 31, 1922, so that the consumption for the full crop year 1922 will probably be more than double that in the crop year 1921. The figures show that the increased consumption of Pima cotton has been due mainly to much larger takings by New England, inasmuch as its use in Southern mills has declined absolutely as well as relatively, and as the increased use in "all other" States is relatively small.

TABLE 8.—*Consumption of Egyptian and American-Egyptian cotton in the United States, by industries.*

Month.	Egyptian cotton, in 500-pound bales.					American-Egyptian cotton, in running bales.[1]				
	Total.	Tire fabrics.	Sewing thread.	Fine cloths.	Other industries.	Total.	Tire fabrics.	Sewing thread.	Fine cloths.	Other industries.
1920.										
August	26,682	13,863	4,286	3,444	5,089	2,549	1,687	319	208	335
September	19,581	9,276	4,678	2,743	2,884	1,590	1,236	225	61	68
October	12,867	5,201	3,719	2,572	1,375	1,194	838	212	66	78
November	10,236	4,669	3,220	1,404	943	771	421	183	50	117
December	7,219	3,196	2,435	859	729	887	583	183	32	89
1921.										
January	7,680	4,308	2,068	911	393	389	182	96	85	26
February	7,100	3,117	2,457	903	623	836	657	32	102	45
March	9,705	4,428	3,664	976	637	947	779	45	87	36
April	12,198	6,990	3,644	751	813	1,337	1,148	4	153	32
May	14,765	9,637	3,511	857	760	1,838	1,469	59	259	51
June	15,446	9,400	3,983	985	1,078	1,962	1,360	158	327	117
July	15,717	10,420	3,273	1,006	1,018	2,471	1,938	104	248	151
12 months	159,196	84,505	40,938	17,411	16,342	16,771	12,298	1,650	1,678	1,145
Per cent	100.00	53.08	25.72	10.94	10.26	100.00	73.33	9.84	10.00	6.83

[1] Of approximately 500 pounds each.

TABLE 8.—*Consumption of Egyptian and American-Egyptian cotton in the United States, by industries*—Continued.

Month.	Egyptian cotton, in 500-pound bales.					American-Egyptian cotton, in running bales.[1]				
	Total.	Tire fabrics.	Sewing thread.	Fine cloths.	Other industries.	Total.	Tire fabrics.	Sewing thread.	Fine cloths.	Other industries.
1921.										
August	20,263	13,824	3,906	1,329	1,204	2,239	1,729	65	347	98
September	15,895	8,723	4,137	1,579	1,456	2,158	1,213	322	445	178
October	18,891	10,686	4,988	1,143	2,074	2,277	1,036	604	542	95
November	22,291	13,288	5,542	1,160	2,301	2,557	1,305	608	425	219
December	20,779	12,611	5,526	841	1,801	3,240	1,708	598	558	376
1922.										
January	20,783	13,702	4,483	1,064	1,534	4,030	2,394	795	653	188
February	19,908	12,357	4,599	1,543	1,409	3,759	2,259	787	614	99
March	20,379	11,561	6,003	1,584	1,231	4,286	2,066	872	1,191	157
8 months	159,189	96,752	39,184	10,243	13,010	24,546	13,710	4,651	4,775	1,410
Per cent	100.00	60.78	24.62	6.43	8.17	100.00	55.85	18.95	19.45	5.75

[1] Of approximately 500 pounds each.

Mill consumption by industries.—Table 8 herewith has been prepared, from an analysis of the original census records, to show the consumption of Egyptian cotton (including all varieties) and of American-Egyptian cotton in particular branches of the cotton industry.

In making this distribution it has been comparatively easy to pick out mills which produce tire fabric, thread, and fine cloth, or which produce yarns for such goods. In a few instances, however, where the same mill makes yarn for different industries it has been tabulated under the industry to which it mainly caters, or where that was difficult to determine, under "other industries." "Other industries" include, in addition to a relatively small amount used in mattress factories, mainly knitting yarns. There is a margin of possible error in that some of these knitting-yarn mills at times produce more or less yarns for use in tire-fabric, thread, or fine cloth, but inasmuch as the consumption noted under "other industries" is less than 10 per cent of the total, the margin of understatement in the case of the three particular industries recorded is believed to be small.

It is seen that the tire-fabric industry is the largest consumer of both Egyptian and Pima cotton, accounting for over half of the total in both instances. It uses about seven bales of Egyptian for each bale of Pima, and tends to use relatively more Egyptian and relatively less Pima. The tire-fabric industry requires annually not more than 36,000 to 42,000 bales of cotton of such staple as Sakellarides and Pima,[7] and 80 to 90 per cent of the Egyptian cotton used by tire fabric manufacturers is upper Egyptian as compared with 10 to 20 per cent Sakellarides.[8] The tire-fabric industry is therefore using about as many bales of Pima as of Sakellarides, but its use of the two combined is only about one-third of its use of Egyptian uppers.

[7] "Statement opposing tariff on long-staple cotton" (p. 4), submitted in December, 1921, to the Senate Finance Committee by the tire manufacturers' division of the Rubber Association of America (Inc.), which includes in its membership approximately 125 automobile-tire manufacturers.

[8] Ibid, p. 7.

The sewing-thread industry is the second largest user of Egyptian cotton but apparently the largest user of Sakellarides. This industry requires Sakellarides not only for making fine thread but also for making coarse thread where special strength is required, such as shoe thread; it is also used in making embroidery and crochet "cottons." The amount of uppers included in the Egyptian cotton used by this industry is small. The amount of Pima used by the thread industry is small as compared with its consumption of Sakellarides, but has increased so markedly during the past eight months that its increasing substitution for Sakellarides is very evident. This substitution has been due in large measure to the very much lower price, relative to Sakellarides, at which Pima cotton could be bought since the passage of the emergency tariff act.

The fine-cloth mills afford the most striking instance of the substitution of the cheaper Pima for the Sakellarides type during recent months. These mills when they use Egyptian require mainly Sakellarides, but their consumption of Egyptian cotton has decreased and their consumption of Pima greatly increased. It is said that Sakellarides is still required for cloths made of the finest yarns, but that Pima is being rapidly substituted for Sakellarides in cloths made of yarns not finer than 80s. Introduced because of its lower price, it is finding increased favor with the fine-cloth mills of New England, particularly those of New Bedford, for use in the manufacture of mercerized sateen linings as well as in voile and fine lawns.

The column for "other industries" includes mainly those producing knitting yarns and yarns for special purposes; these, as a group, show an increase in the use of Pima cotton relative to Egyptian, but the increase is not so marked as in the thread and fine-cloth industries.

STOCKS ON HAND OF EGYPTIAN AND AMERICAN-EGYPTIAN COTTON.

The following data, compiled by the Bureau of the Census, show, by months, the stocks on hand in the United States of imported Egyptian cotton of all kinds during the past seven crop years, and of American-Egyptian cotton during the past two crop years.

TABLE 9.—*American stocks at end of each month.*

[Crop years ended July 31.]

Month.	Egyptian cotton (equivalent 500-pound bales).							American-Egyptian cotton (running bales).	
	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1920–21	1921–22
August	115,208	167,256	98,722	84,496	46,315	198,780	113,112	19,060	51,883
September	104,956	153,262	88,906	79,201	70,668	182,969	98,589	17,190	49,166
October	90,595	131,673	70,351	73,273	68,155	167,896	85,384	13,656	50,410
November	81,358	108,899	53,244	63,313	63,609	157,715	99,195	29,991	58,351
December	74,148	92,401	44,834	67,732	71,212	153,958	116,375	43,949	61,739
January	85,368	100,662	44,571	58,566	88,417	150,239	127,711	50,661	91,293
February	121,766	113,317	45,053	48,730	105,991	145,263	126,584	53,974	92,637
March	128,688	122,124	34,120	39,741	133,170	144,039	147,896	54,794	92,919
April	144,863	135,754	41,586	40,713	229,707	148,990	.....	56,023	.....
May	168,183	126,573	51,830	52,282	259,336	147,051	.....	53,946	.....
June	168,670	133,114	65,984	53,977	244,954	142,319	.....	54,285	.....
July	182,608	117,912	67,278	51,757	220,099	128,062	.....	55,237	.....

Since imports of Egyptian cotton are mainly in the December-April period of each year, it is not surprising to find that American stocks of Egyptian cotton (including all types) in the spring of 1922 are increasing. The stocks of Egyptian cotton on hand March 31 are, however, larger in 1922 than for the similar date in any preceding year. At the same time it is seen that stocks on hand of American-Egyptian cotton are also increasing and were larger on March 31, 1922, than ever before recorded.

THE EXPORT OF AMERICAN-EGYPTIAN COTTON.

Exports of American-Egyptian cotton are not separately recorded. The following extracts from the Daily News Record, of New York City, are of interest in this connection.

PIMA COTTON FOR EUROPE.

Phoenix, Ariz., February 19, 1922.—The first consignment of Pima cotton to the mills of Europe has started on its way. Under the Toll plan, the Farmers Ginning Co. has shipped the Arizona Pima cotton to the Kuffler mills. The carloads will go first to the compressor at San Pedro, where they will be loaded for shipment to Europe. Arriving at Hamburg, they will be railroaded to the mills about Prague, where the cotton will be spun into cloth and this cloth, a particularly fine product of the mills, will be disposed of through Hamburg and Liverpool. Seventy-five per cent of the product of the sales will be returned to the Arizona grower as the price of his cotton.

This plan was evolved by the Czechoslovakian mills and American cotton organizations. The state of exchange in central Europe is such as to make the direct purchase of American cotton prohibitive, consequently arrangements were made with the warrant warehouse of Birmingham, Ala., to collect the consignments of cotton for these mills, the consignments being made under the joint supervision of reputable American representatives in Europe and the Czechoslovakian Government. An advance on consignments is made by the warrant warehouse, by whom also the collections are made for the grower and shipper.

The first cotton shipped under the Toll plan came from the middle south, and brought the producer two or three times the price that the cotton commanded in the home market, it is claimed.

POSSIBILITY OF GERMANY AS LONG-STAPLE OUTLET.

Phoenix, Ariz. March 15, 1922.—A German market for Arizona long-staple cotton can be easily developed if growers will cooperate with textile manufacturers in Germany, William Paar, Los Angeles importer, told officials of the Arizona Pima-cotton Growers' Association at their recent conference. Mr. Paar has just returned to the States from a tour of Central European countries during which time he visited many of the leading textile mills of Germany.

"German experts have declared your long-staple variety superior to Egyptian Sakell for the manufacture of certain kinds of fine textiles, such as lisle silk, imitation linens, and cotton goods for underwear," Mr. Paar said.

"Two of Germany's foremost textile experts have passed upon the quality of Arizona cotton. Professor Johannson, recognized as the foremost cotton expert in all Germany, examined samples of Arizona cotton sent by the Arizona Pima Cotton Growers' Association. 'I have never seen a raw material so suitable for the manufacture of high-class textiles, such as lisle silk for hosiery, underwear, and imitation linens,' Professor Johannson was quoted as saying.

"Prof. J. Schiertz, textile expert of the Cologne University, had the following to say of Arizona long staple:

"'I have examined the samples of Arizona cotton given me by Mr. Paar and I consider this cotton extremely adapted for replacing Egyptian cotton.'

"If your growers will agree to the Toll plan, however, there is no doubt that a market for your entire crop will be made available to you in Germany.

"You send your raw material to the German spinner on consignment. He manufactures it into the finished product, returning the finished article to you and the manufacturer receives his pay in raw material. This assures him against probable losses through the increasing or decreasing of the mark value on foreign exchange. It obliterates the gambling aspect of the transaction and establishes the market on a sound business basis."

EFFECT OF TARIFF ON COTTON OF 1⅛ INCHES AND OVER.

The quantity of cotton imported and the price of competitive domestic cotton are influenced by various factors other than the tariff, particularly by supply and demand, and it is necessary to give due weight to such factors when attempting to evaluate the effect of the tariff duty.

Cotton having a staple of 1⅛ inches or more is usually considered essential in the manufacture of warp yarns of 80s and above or of filling yarns of 90s and above. Because of its relatively high price, cotton of this length staple is not ordinarily used for lower counts except where strength is a more important consideration than price.

Cotton of 1⅛ inches or more is, because of its length, necessary in the manufacture of fine yarns for the higher numbers of sewing thread, for fine cloths, such as lawns, organdies, and voiles, and for fine knit goods, laces, etc. Because of its strength, it is used in the best grades of tire fabrics, in shoe threads, in embroidery cottons, and in cotton warp for high-class mohair linings.

Prior to the passage of the emergency tariff act May 27, 1921, it is probable that the largest use of Sakellarides was by the tire-fabric industry, but it is important to note the extent to which, even before that time, cotton of shorter staple had been displacing cotton of the staple that is now dutiable. The number of motor vehicles registered in the United States rose from 1,254,971 in 1913 to 3,512,996 in 1916, an increase of 180 per cent. During this period the import of Egyptian cotton increased only 82 per cent, showing that the proportion of domestic cotton, particularly cotton of less than 1⅛ inches, used in tire fabrics, must have increased. During the next few years the industry was affected by the war, and in 1918 tire-fabric production was curtailed by Government order. The number of motor vehicles in use has grown each year, in 1921 amounting to 10,125,000, about eight times as many as in 1913 or nearly three times as many as in 1916, yet the mill consumption of Egyptian cotton, although showing a sudden spurt in 1920, is not now (1922) as large per month as it was in 1916. Not only have the import and use of Egyptian cotton not kept pace with the demand for cotton by this industry, but the relative proportion of Sakellarides has decreased since the passage of the emergency tariff act. The decrease in the use of Sakellarides has not resulted in any material increase in the use of Pima, and the increasing demand for tires is being met most largely by the use of Egyptian uppers and of American staple cottons of 1 3/16 to 1¼ inches. Higher prices for extra long staple cotton, as compared with pre-war prices, the excessive competition in the tire industry, and the greater use of cord tires (where the strength necessary is attained by ply yarns rather than by long-staple fiber), have greatly reduced the necessity for the employment of extra long staple cotton by tire manufacturers.

The largest users of Sakellarides cotton are now (1922), in the order named, probably the sewing-thread industry, the tire industry, fine cloth weavers, and the knitting industry. In the case of fine yarns for thread, cloth, and knit goods there is a decided tendency toward the substitution of Pima for Sakellarides, because of the lower price of the domestic cotton.

The total imports of Egyptian cotton during the months of the last three crop years, and the imports of dutiable cotton since May, 1921, have been as follows:

TABLE 10.—*Total imports of Egyptian and of dutiable cotton.*

Month of crop year.	Total imports of Egyptian cotton.	Dutiable cotton.			Proportion of total dutiable cotton to total Egyptian.
		Quantity.	Total value.	Value per pound.	
1919.	*Pounds.*	*Pounds.*		*Cents.*	*Per cent.*
August	5,639,715				
September	22,934,190				
October	5,510,065				
November	15,509,774				
December	13,678,977				
1920.					
January	33,276,457				
February	48,261,821				
March	55,476,207				
April	28,058,777				
May	3,445,091				
June	4,226,350				
July	6,484,538				
August	6,437,879				
September	1,246,070				
October	5,840				
November	1,470,715				
December	4,041,337				
1921.					
January	3,527,353				
February	3,954,053				
March	6,793,705				
April	7,594,835				
May	3,184,534				
June	4,101,036	1,137,249	$296,187	26.04	27.73
July	1,226,201	570,854	126,476	22.16	46.55
August	2,363,992	865,746	206,943	23.90	36.62
September	1,697,996	749,965	178,787	23.84	44.17
October	9,486,021	2,180,711	797,946	36.59	22.99
November	13,563,177	1,805,754	588,584	32.59	13.31
December	20,611,870	2,051,858	697,641	34.00	9.95
1922.					
January	12,964,701	737,924	285,638	38.70	5.69
February	18,121,194	4,144,891	1,240,682	29.93	22.87
March	23,818,001	4,732,436	1,642,058	34.70	19.87

Small amounts of dutiable cotton come from Peru and the West Indies, but imports of dutiable cotton are so largely the Sakellarides variety from Egypt that the preceding table can be taken as showing with close approximation the ratio of dutiable cotton from Egypt to the total cotton from Egypt. Importers state that prior to the passage of the emergency tariff act imports of Egyptian cotton consisted of 40 to 50 per cent Sakellarides and 50 to 60 per cent "uppers." The imposition of a duty came at a time when the American cotton industry was just beginning to recover from a period of acute depression and between seasons of crop production, so that its effects were slight until the new Egyptian crop came on the market in the fall. Its effect was then apparent, not in reducing imports of cotton from Egypt, as these actually increased considerably over those of the previous year, owing to the greater demand occasioned by mills getting back to a more normal consumption, but in greatly reducing the proportion of Sakellarides cotton in the

otal imports of cotton from Egypt. In January, 1922, for instance, akellarides constituted less than 6 per cent of the total Egyptian otton imported.

During June, July, August, and September of 1921, imports of Egyptian cotton were very small, but this would have been the case even if there had been no duty. The Egyptian crop is marketed in the fall, and imports are mainly in the period lasting from November to April. The effect of the emergency tariff act must therefore be judged during the latter period.

With improvement in domestic demand, the arrival of the new crop at Alexandria, and an upward trend in prices, buying of Egyptian cotton for American consumption was stimulated, and imports during the period November, 1921, to April, 1922, have been, notwithstanding the new tariff duty, larger than for the same period during the preceding year. It will be noted that the average unit value of dutiable cotton during these months has increased over that of the months up to October; this increase has not been due to the duty (which is not included in the invoice prices stated) but to an increase in the market price of Egyptian the world over.

During the months of February and March, 1922, there has been an increase in the proportionate amount of Sakellarides imported; in fact during February, 1922, imports of Sakellarides exceeded imports of Egyptian cotton of all kinds during the month of February, 1921. The American demand has, of course, greatly increased with the resumption of mill activity, but the larger proportion of Sakellarides is in good measure due to the scarcity of uppers [9] which forced mills wishing to sell fabrics made from "Egyptian" cotton to use more of the longer and higher priced variety. It is to be remembered that uppers constitute less than one-half of the Egyptian crop. Considering the different conditions of supply and demand prevailing in 1922 as compared with 1921, it is evident that the operation of the emergency tariff act has effected a large reduction in the use of Sakellarides cotton; i. e., imports have been less than they would have been without the imposition of a duty.

A study of the Boston prices of imported Egyptian "Sakellarides" and of American-Egyptian "Pima" cotton does not show that the duty levied on cotton of 1⅛-inch staple and longer has had any effect in raising the price of such domestic cotton. To illustrate, there is shown herewith a comparison of the prices of two grades of Sakellarides and two grades of Pima as printed weekly in the market circular of the United States Department of Agriculture.

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[9] Ralph Lawson, of John Malloch & Co., Boston, in an interview published in the Daily News Record of Dec. 18, 1921, stated:

"The United States has thus far bought about 90,000 bales of Egyptians this season. At least sixty-odd thousand bales had been shipped up to Dec. 1, and I do not think an estimate of 30,000 bales contracted for December, January, and February shipment an overestimate. By far the major portion of this buying had been of uppers, and as the present crop will not be over 100,000 bales and the carryover from last season was estimated at from 20,000 to 40,000 bales, it will be seen that upper Egypt cotton should be scarce by spring. A recent cable from Alexandria estimates that there are not over 10,000 bales of upper Egypt cotton available in Egypt outside of exporters' stocks. Sakel cotton, on the other hand, is very plentiful and it is really remarkable how the price has held in view of the tariff against it in this country and the relatively small demand from other parts of the world. At the moment it would look as if there were more than enough Sakel to satisfy the world for at least 12 months.

"Arizona Pima cotton has been in poor demand, and is relatively very cheap as compared with Sakel, when one takes the duty into consideration. No. 2 Pima has sold as low as 34 cents, which is 5 cents cheaper than the equivalent grade of Sakel and 12 cents cheaper, counting the duty. Many spinners have lately been experimenting with Pima and are obtaining varying results, but spinners who have used it for several years tell us that they are able to get satisfactory results from it in consequence of careful study in regard to its handling."

TABLE 11.—*Comparison of Boston prices of Sakellarides and Pima cotton.*

(From the weekly Market Reporter of U. S. Dept. Agr.[1])

[Cents per pound.]

Date.	Fully good Sakellarides—		No. 2 Pima.	Margin of Sakel over Pima.	Good fair Sakellarides.		No. 3 Pima.	Ma of S o Pi
	Without duty.	With duty.			Without duty.	With duty.		
1921.								
Jan. 1	43½	.....	35½	7¾	35½	.....	34¼	
8	41	.....	33	8	33	.....	32	
22	45¼	.....	36⅜	8⅞	36⅜	.....	35¼	
29	42⅜	.....	32⅜	9⅞	33⅜	.....	.....	.....
Feb. 5	41¼	.....	32⅜	9⅛	33⅜	.....	.....	.....
12	40¼	.....	32⅜	8⅞	32⅜	.....	31¼	
19	41	.....	32⅜	8⅞	32⅜	.....	31¼	
26	37⅛	.....	28⅛	9	28⅛	.....	27⅛	
Mar. 5	32	.....	23½	8½	23½	.....	22½	
12	35⅞	.....	26⅜	9	26⅜	.....	25¼	
Apr. 2	39¼	.....	32	7¼	32	.....	31	
9	41	.....	32	9	32	.....	31	
16	38⅜	.....	29⅜	9⅛	29⅜	.....	28¼	
30	40	.....	32	8¼	31¼	.....	31	
May 7	39½	.....	.....	.....	30½	.....	.....	.....
14	41½	.....	32	9½	32½	.....	31	
21	.....	.....	32	.....	.....	.....	31	.....
28	36½	.....	34	2½	26½	.....	33	
June 4	36½	43½	35	8½	26½	33½	34	
11	34⅜	41⅜	35⅛	7⅛	25⅛	32⅛	33⅛	
18	34½	41½	33	9½	25½	33½	32	
25	33½	40½	33	7½	25½	32½	32	
July 2	32½	39½	31	8½	24	31	.....	.....
9	34½	41½	32	9½	24⅛	31⅛	31	
16	33½	40½	33	7½	25½	32½	33	
23	34½	41½	34	7½	24½	31½	34	
30	35½	42½	33	9½	26½	33½	33	
Aug. 6	35½	42½	33	9½	25½	32½	33	
13	36⅛	43⅛	33	10⅛	27	32	33	
20	37½	44½	34	10½	27½	32½	34	
27	37½	44½	32	12½	26½	33½	32	
Sept. 3	43⅛	50⅛	35	15⅛	27½	34½	35	
10	41½	48½	35	13½	31½	38½	35	
17	46½	53½	35½	18½	34	41	34	
24	46½	53½	40	13½	33½	40½	37	
Oct. 1	49½	56½	42	14½	36½	43½	39	
8	63½	70½	40	30½	49½	56½	37	
22	56½	63½	46	17½	43	50	44	
29	57½	63½	41	19½	42½	49½	38	
Nov. 5	51½	58½	41	17½	38½	45½	38	
12	51½	58½	41	17½	38½	45½	38	
19	48½	55½	40	15½	38½	45½	37	
26	46½	53½	37	14½	36½	43½	35	
Dec. 3	48½	55½	38½	17½	37½	43½	36	
31	51½	58½	34	14½	38½	45½	32	
1922.								
Jan. 7	52½	59½	37	22½	39	46	35	
14	52½	59½	39	20½	39½	46½	37	
21	50½	57½	39	18½	37½	44½	36½	
28	49½	56½	39	17½	35½	42½	36½	
Feb. 4	49½	56½	37	19½	35½	42½	34½	
11	46	53	35½	17½	32	38½	33½	
18	.....	.....	.....	.....	[2] 34½	41½	34	
25	48½	55½	36	19½	36½	43½	34	
Mar. 4	48½	55½	36	19½	36	43	34	
11	47½	54½	33	21½	35½	42½	31	
18	48½	55½	33	22½	35½	42½	31	
24	.....	.....	32½	.....	[2] 35½	42½	30½	
31	.....	.....	32½	.....	[2] 34½	41½	30½	
Apr. 7	46½	53½	32½	21½	34½	41½	30½	
14	46½	53½	31	22½	33½	40½	29	
21	44½	51½	31	20½	32½	39½	29	
28	46½	53½	32	21½	35	42	30	
May 6	47½	54½	34	20½	35½	42½	32	
12	48	55	35	20	36½	43½	33	

[1] Name changed in January, 1922, to "Weather, Crops, and Markets" of U. S. Dept. Agr.
[2] Quotations from the Daily News Record.

It is seen from Table 11 that in the months prior to the passage the emergency tariff act the Boston landed price of fully good akellarides was 8 to 9 cents a pound higher than the Boston price of ima No. 2; similarly, that the price of good fair Sakellarides was bout 1 cent a pound higher than that of Pima No. 3.

When the emergency tariff act of May 27, 1921, went into effect he between-season market was lifeless, and both imports and consumption of long-staple cotton were at a low ebb. This slack period was, however, probably the only time at which the duty affected prices. Egyptian surplus stocks were offered very cheap, although with few takers, whereas Pima, reinforced by the duty, maintained a better level. During June and July of 1921, fully good Sakellarides was landed, ex duty, at the same or only slightly above the price of Pima No. 2, whereas good fair Egyptian was landed, ex duty, at prices considerably below Pima No. 3.

When the new Egyptian cotton crop began to come on the market, various factors, such as the abnormally low estimate of the American cotton crop made by the United States Department of Agriculture and an increasing world demand for manufactured goods, caused prices of Egyptian cotton to rise rapidly, whereas American mills increased but slightly their actual purchases of Pima cotton. By October 8, 1921, fully good Sakellarides was selling on the Boston market, duty paid, at 70⅞ cents a pound as compared with only 40 cents for Pima No. 2; similarly, good fair Sakellarides was selling at 56⅝ cents as compared with only 37 cents for Pima No. 3.

From the October peak the prices of both Sakellarides and Pima gradually, with occasional reactions, slumped, but the American demand for Sakellarides has at all times been better than the American demand for Pima. On March 18, 1922, fully good Sakellarides was selling in Boston, duty paid, at 22½ cents a pound above Pima No. 2, and similarly good fair Sakellarides was bringing 11⅞ cents a pound above Pima No. 2. Even without the duty, Sakellarides cotton is selling to-day in Boston at a higher price, as compared with Pima, than was the case when the emergency tariff act became effective.

The only conclusion to be drawn from the above is that, with the exception of two months during the dull season just after the duty went into effect, the emergency tariff act has had no effect in increasing or even in upholding the price of Pima cotton. Even during the period stated the effect was slight, inasmuch as there were few purchases, and it is to be noted that American purchases of Sakellarides were most largely during the fall, when the margin of Sakellarides over Pima was much greater. It is clear that American spinners are willing to pay a much higher price for $1\frac{7}{16}$-inch Sakellarides than they are for $1\frac{5}{8}$-inch Pima.

Short-staple uplands is the basic cotton crop of the world, and prices of other cottons necessarily follow a rise or fall in the price of uplands. Such variations from the price of the basic cotton are influenced and accentuated by special factors. Pima and Egyptian cottons tend to come together in periods of low prices and to draw apart on a rising market. The Pima crop, very much smaller than the Egyptian and in a few hands, is less subject to speculation, and being more securely financed and marketed by a few large growers can hold its level better in a distress market. It is largely controlled by the Pimacotton Growers' Association, and Government funds available through the War Finance Corporation, have been used to

enable the growers to hold for better prices. The Egyptian Government also assists its growers, not only by advances through the National Bank of Egypt but also by the direct purchase of cotton in periods of depression. The Egyptian prices are affected primarily by conditions in the fine spinning industry of England, its main market, and secondarily by the American demand.

The marketing of long-staple cotton is not entirely a matter of price. It is also largely a question of quality. This results from the fact that apparently slight superficial differences in cotton occasion great differences in spinning characteristics, so that the substitution of one type of cotton for another is not so simple a proposition as it appears to the layman. Mills maintain that it requires considerable adjustment of preparatory and spinning machinery to change from Egyptian Sakellarides of $1\frac{7}{16}$-inch staple to American Pima cotton of $1\frac{3}{4}$-inch staple, and that it is inadvisable to go to this expense as long as the supply of the longer stapled Pima is uncertain; the change is also distasteful to operatives who have become accustomed to working on Sakellarides. For these reasons some mills will pay a better price for a cotton which they have previously handled than for a comparable new type which in the finished product may be just as good.

Sea-island cotton was at one time the only type of extra long-staple cotton on the market. Experimentation in Egypt developed varieties that were equal in length and strength of staple to most of the sea island, although somewhat inferior in fineness and luster. For most purposes the Egyptian cotton was as usable as the sea island, yet it was with considerable difficulty, notwithstanding the continuous cooperation of the Egyptian Government, that growers of long-staple Egyptian were able to secure a permanent market for their cotton. The increasing demand for long-staple cotton afforded them the opportunity of establishing connections, and the subsequent decline of the sea-island crop has given Egyptian cotton practically universal preference in the long-staple industry.

The growers of Pima cotton find themselves in a similar difficulty. Mills which have become accustomed to the extra-long staple Egyptian Sakellarides are willing to pay more for it if necessary, or, if the yarn count to be spun is not too high, to substitute shorter staple Egyptian uppers. This is not altogether because of their own preference but frequently because of the prejudices of consumers of their goods who insist on "Egyptian" cotton but not necessarily on any particular variety or staple of Egyptian. Therefore, without considerable price advantage to cover the cost of experimentation, many mills feel that they can not run the risk involved in a substitution of American grown cotton for the Egyptian.[10] Spinners of fine

[10] The Daily News Record (of New York City) in its issue of Feb. 4, 1922, states in a review of the New Bedford market:

"Pima has commanded more than its usual share of interest among the long cottons. Cotton men declare that there can be no overlooking the fact that the use of Pima for fine goods is meeting with considerable favor with the mills where it has been introduced. Last week the Pima shippers held out against the offers, based on a good demand early in the week, and prices were held more firmly than other grades of cotton. This week Pimas took their tumble, while other prices were strengthening. All grades of Pima were this week about 2 cents a pound under the quotations of a week ago.

"One local broker who said frankly that he regards Pima much lower than the same Sakellarides cotton, explained that the Pima interests must discount this by a realization that Pima is not known thoroughly enough by the mills to enable them to push that cotton to its full value yet.

"'They do not seem to realize the fact that they have a type of cotton with which most mills are not familiar,' he said. 'In order to introduce it and get any considerable number of mills into the habit of using it—to get the workers experienced enough in running it through the mill machinery so that they can get out of the cotton all the value there is in it—I believe it is absolutely essential that the cotton be made especially attractive from a price standpoint.'"

ns, particularly thread manufacturers, maintain that notwithnding its extra length, Pima has not the character or strength of ellarides, and therefore can not be satisfactorily substituted in the nufacture of fine counts above No. 80.

The world demand for cotton of extra long staple has been increasfaster than the supply, and the probability is that, duty or no y, the surplus stocks resulting from the recent depression will dually be absorbed and long staple cotton from any source, yptian, American, or other, become increasingly easy to market.

APPENDIX.

Foreign tariff duties on raw cotton, ginned.

(As compiled by the Bu. of For. & Dom. Com. for Aug. 15, 1921.)

Country.	Foreign units.	Rate of duty.	Cents per pound.
Europe:			
Austria-Hungary		Free	Free.
Belgium		Free	Free.
Bulgaria	Silver lev per 100 kilograms, gross	20	2.1010.[1]
Denmark		Free	Free.
France		Free	Free.
Germany		Free	Free.
Greece		Free	Free.
Holland		Free	Free.
Italy	Lire per 100 kilograms, net	3	0.2626.
Norway		Free	Free.
Portugal	Milreis per kilo, net	0.030	1.26.
Rumania	Leu per 100 kilograms, gross weight	1	0.0875.[2]
Russia	Roubles per pood, net	4	5.7043.[3]
Serbia		Free	Free.
Spain	Pesetas per 100 kilograms, gross weight	1.30	0.1138.
Sweden		Free	Free.
Switzerland	Francs per 100 kilos	1	0.0877.
Turkey	Per cent ad valorem	11 per cent	11 per cent.
United Kingdom		Free	Free.
Asia:			
British India		Free	Free.
Ceylon		Free	Free.
China	Haikwan taels per ciul, net	0.8	0.43.[4]
Chosen		Free	Free.
French Indo-China		Free	Free.
Persia		Free	Free.
Siam	Ad valorem	3 per cent	3 per cent.
Japan		Free	Free.
Oceania:			
Australia		Free	Free.
New Zealand	Pence per pound	4	8.1108.
Philippine Islands		Free	Free.
Africa:			
Algeria		Free	Free.
British South Africa		Free	Free.
Egypt	Ad valorem	8 per cent	8 per cent.
Morocco	do	12½ per cent	12½ per cent.
South America:			
Argentina	On a valuation of 0.36 peso per kilo, with inner packing.	5 per cent	0.789.
Bolivia	Boliviano per kilo, gross weight	0.07	1.23.
Brazil	Milreis per kilo	1.09	6.93.[5,6]
Colombia	Per kilo, gross weight	0.03	1.388.[5]
Chile		Free	Free.
Ecuador	Sucres per kilo, gross weight	0.025	1.2167.[7]
Paraguay	On a valuation of 0.48 peso per kilo, gross weight.	42 per cent	9.1583.[5]
Peru	Soles per kilo, gross weight	0.05	1.3272.[8]
Do	do	0.05	1.305.[9]
Uruguay		Free	4 per cent.[10]
Venezuela	Bolivar per kilo, gross weight	0.25	3.433.[5]

[1] Conventional rate, including surtax.
[2] Rate varies according to fluctuations of standard of value.
[3] Cotton of Persian origin is admitted at 0.57043 cents per pound.
[4] At Shanghai 0.309 cents per pound, including surtax of 3 per cent.
[5] Including surtax.
[6] There is a deduction of 2 per cent of weight for tare if packed in bales.
[7] There is a surtax of 2 per cent ad valorem.
[8] Including surtax, at the ports of Callao, Salaverry, Paita, and Pisco.
[9] Including surtax, at other ports.
[10] Ad valorem surtax.

Foreign tariff duties on raw cotton, ginned—Continued.

Country.	Foreign units.	Rate of duty.	Cents per pound.
North and Central America:			
Canada		Free	Free.
Costa Rica	Peso per kilo	0.05	1.1104.[11]
Do	do	0.05	1.0786.[12]
Cuba	Dollars per 100 kilos, gross weight	0.70	0.3175.[13]
Dominican Republic	do	10.00	4.5360.
Guatemala	Peso per kilo, gross weight	0.03	0.722.[13]
Haiti	Ad valorem	20 per cent	23.8 per cent.[9]
Honduras	Peso per half-kilo, gross weight	0.10	3.9272.[14]
Mexico	Peso per kilo, gross weight	0.25	6.2249.[8]
Nicaragua	Peso per 100 kilos, gross weight	1	0.5114.[8]
Newfoundland		Free	Free.
Panama	Ad valorem	15 per cent	15 per cent.
Salvador		Free	Free.
United States	Less than 1⅛ inches in length	Free	Free.
	1⅛ inches or more in length	7 cents a pound	7.00.

[9] Including surtax.
[11] Including surtax for Provinces of Limon.
[12] Including surtax for other Provinces.
[13] Rate to United States; to other countries, 0.4536 cents per pound.
[14] Rate varies according to fluctuations of standards of value.

NOTE.—In general, conversions are based on the par or fixed standard rates of currency. In some instances the market rates of exchange have fallen below the standards which prevailed for a long time before the war.

WORLD SUPPLY OF AND DEMAND FOR EXTRA-LONG-STAPLE COTTONS.

The Cotton Research Board, of the Ministry of Agriculture, Egypt, in its first annual report, 1920, stated:

When other sources of supply are considered, it will be seen that there is a great potentiality in Egypt for an increased production of Sakel, and in consequence, other factors being equal, for a lowering in price. But the future trade for fine cottons has an equally great possibility of increasing, and it may absorb all the fine cottons that can be produced and demand more. The increase of the motor-tire trade and the expansion of airplane traffic, the increased substitution of fine cotton fabrics for silk, the increased education of the masses and the consequent demand for more luxurious fabrics, all indicate that, in spite of the general depression now prevailing, it may be expected that the demand for long-staple cotton will increase.

After stating that the production of sea-island cotton in the United States and the West Indies (British and Dutch) may be disregarded because of their smallness and the fact that their use is so highly specialized for a particular class of work that they can not be considered as serious competitors of the Egyptian crop, the Cotton Research Board estimates the present and future positions of the extra long staple cotton crop (presuming that the present normal return per feddan or acre is maintained) as follows:

Country.	Present outturn.[1]	Possible outturn 30 years hence.[1]	Maximum possible after a long period.[1]
Egypt	550,000	1,075,000	1,075,000
Gazira, Sudan	9,000	56,000	186,000
Tokar and Kassala, Sudan	10,000	80,000	100,000
American-Egyptian	35,000	200,000	310,000

[1] In 500-pound bales.

Buying and selling prices of Egyptian cotton as fixed by the Cotton Control Commi in 1918.[1]

UPPER EGYPT.

Type No.	Mark.	Description.	Buying price.	Sel pr f. o
			Tallari.[2]	*Tall*
1	UAA....	Fully good extra staple	40	
2	UAB....	Fully good medium staple	39	
3	UAC....	Fully good short staple	37½	
4	UBD....	Good extra staple	38	
5	UBE....	Good medium staple	37	
6	UBF....	Good short staple	36	
7	UCG....	Fully good fair to good extra staple	36	
8	UCH....	Fully good fair to good medium staple	35½	
9	UCJ....	Fully good fair to good short staple	35	
10	UDK....	Fully good fair good staple	35	
11	UDL....	Fully good fair staple	34½	
12	UEM....	Good fair to fuly good fair good staple	33	
14	UEO....	Good fair to fully good fair fair staple	32	
15	UFP....	Good fair good staple	32	
16	UFR....	Good fair fair staple	31	
17	UGS....	Fully fair average staple	27½	
18	UHT....	Fair to fully fair average staple	26	
19	UJV....	Fair	23½	
21	ULZ....	Middling fair	20	
22	UMA....	Middling	15	
23	UOB....	Low middling	10	
		SAKELLARIDES.		
30	SAA....	Fully good extra fine staple	57	
31	SAB....	Fully good good staple	54	
32	SAC....	Fully good fair staple	52	
33	SAD....	Fully good short staple	49	
34	SBE....	Good extra fine staple	53	
35	SBF....	Good good staple	50	
36	SBG....	Good fair staple	48	
37	SBH....	Good short staple	45	
38	SCJ....	Fully good fair to good extra fine staple	48	
39	SCK....	Fully good fair to good good staple	46	
40	SCL....	Fully good fair to good fair staple	44½	
41	SCM....	Fully good fair to good short staple	43	
42	SDO....	Fully good fair extra staple	43½	
43	SDP....	Fully good fair medium staple	42	
44	SDR....	Fully good fair short staple	41	
45	SES....	Good fair to fully good fair extra staple	41½	
46	SET....	Good fair to fully good fair medium staple	40½	
47	SEV....	Good fair to fully good fair short staple	40	
48	SFX....	Good fair good staple	40	
49	SFZ....	Good fair fair staple	39	
50	SGA....	Fully fair to good fair good staple	38	
51	SGB....	Fully fair to good fair fair staple	37	
52	SHC....	Fully fair average staple	35	
53	SJD....	Fair to fully fair average staple	33	
54	SKE....	Fair average staple	30	
55	SLF....	Middling fair to fair average staple	25	
56	SMG....	Middling fair average staple	20	
57	SOH....	Middling average staple	15	
58	SPJ....	Low middling average staple	10	
		BROWN.		
70	BAA....	Fully good extra staple	46	
71	BAB....	Fully good medium staple	44	
72	BAC....	Fully good short staple	41	
73	BCD....	Good extra staple	43	
74	BCE....	Good medium staple	41	
75	BCF....	Good short staple	39	
76	BDG....	Fully good fair to good extra staple	40	
77	BDH....	Fully good fair to good medium staple	39	
78	BDJ....	Fully good fair to good short staple	38	

[1] As quoted in Commerce Reports No. 231, Oct. 2, 1918, pp. 26, 27.

[2] In Egypt cotton is sold in tallari per cantar, which is practically the same as cents per pound. cantar is equal to 99.05 pounds. Egyptian money is based on the millieme. 10 milliemes make 1 p tarif; 200 milliemes make one tallari or dollar; 1,000 milliemes make the pound Egyptian, which is to £1 0s 6d. At normal exchange the pound Egyptian is equal to $4.9431 and the tallari to one-fi this, or 98.86 cents. The price of cotton as stated in tallari per cantar is therefore not materially dif *from dollars per* hundred pounds or from cents per pound.

nd selling prices of Egyptian cotton as fixed by the Cotton Control Commission in 1918—Continued.

BROWN—Continued.

ark.	Description.	Buying price.	Selling price, f. o. b.
		Tallari.	*Tallari.*
K...	Fully good fair good staple	38½	44½
L...	Fully good fair fair staple	37½	43½
M...	Good fair to fully good fair good staple	37	43
O...	Good fair to fully good fair fair staple	36	42
P...	Good fair good staple	35½	41½
R...	Good fair fair staple	34½	40½
S...	Fully fair to good fair good staple	33	39
T...	Fully fair to good fair fair staple	32	38
...	Fully fair average staple	30	36
X...	Fair to fully fair average staple	28	34
Z...	Fair average staple	25	31
A...	Middling fair average staple	20	26
B...	Middling average staple	15	21
C...	Low middling average staple	10	16
	AFRICA.		
A...	Sakellarides, first quality	7	13
B...	Sakellarides, second quality	6	12
C...	Brown, first quality	6½	12½
D...	Brown, second quality	5½	11½
E...	Ashmuni, first quality	7	13
F...	Ashmuni, second quality	6	12
G...	Mixed, third quality	4½	10½
H...	Mixed, fourth quality	3½	9½

PRICES OF EGYPTIAN COTTON AT ALEXANDRIA.

following table is furnished by a leading importer of Egyptian to show the prices in cents per pound of fully good fair Sakel- and fully good fair uppers f. o. b. Alexandria, Egypt. importer states: "These are monthly prices and are as near as get to the average price of each month. By adding 2½ cents d to these prices you will get the c. i. f. Boston prices. Fully ir Sakel corresponds to Pima No. 2 in grade, but the Pima t do the work of Sakel of the same grade, particularly in high- arns. The American staple type which we would compare to per Egyptian prices is Middling $1\frac{3}{16}$ inches."

o. b. Alexandria, Egypt, of fully good fair Sakellarides and of fully good fair uppers.

[Cents per pound.]

ath.	1911–12		1912–13		1913–14		1914–15		1916–17 [1]	
	Sakel-larides.	Up-pers.	Sakel-larides.	Up-pers.	Sakel-larides.	Up-pers.	Sakel-larides.	Up-pers.	Sakel-larides.	Up-pers.
.....	.....	.....	23	16½	21½	17	20¼	15¼	.....	.....
.....	28	18	23	17	22½	17¾	(2)	(2)	34	23
.....	25	16½	21¼	15	23	18¼	16¾	8¼	39	27
.....	23½	15	23	16	22½	18	18	11	46	34
.....	23	14	24	17	22	17¼	.....	9¾	43	36
.....	22	14	23½	17½	21½	16¾	17¼	10½	44	35
.....	23	15	23½	18	21½	16½	18	11	45	38
.....	23	15½	23½	18½	21¾	15½	21	13	48	41
.....	24	16½	23½	19	21¾	16½	22	14	56	49
.....	24¼	17	22¾	18½	22	16½	22	12¾	54	51
.....	24¾	18	22½	18	22¼	16¼	21¾	12¼	60	55
.....	25	18	22	17¾	21¼	16	21	12	70	62

[1] 1915–16 data lacking.

[2] Closed.

Prices f. o. b. Alexandria, Egypt, of fully good fair Sakellarides and of fully good fair uppers—Continued.

[Cents per pound.]

Month.	1917–18		1918–19		1919–20		1920–21		1921–22	
	Sakellarides.	Uppers.	Sakellarides.	Uppers.	Sakellarides.	Uppers.	Sakellarides.	Uppers.	Sakellarides.	Uppers.
August	60	40	[1]	[1]	.....	.....	134	75	30	17
September	48	29	[1]	[1]	57	50	125	60	45	32½
October	46	32	[1]	[1]	60	50	80	40	48	36
November	45	34	[1]	[1]	70	70	70	25	39	30
December	45	37	[1]	[1]	92	90	40	26	40½	31½
January	44	36	[1]	[1]	140	115	35	25	40	29
February	41	34	[1]	[1]	187	140	30	15	34	24
March	44	37	[1]	[1]	165	115	26	20	36	25
April	44½	36½	[1]	[1]	162	110	30	17	35	24
May	43	36	[1]	[1]	126	90	30	17	.....	.....
June	43	37	[1]	[1]	105	80	27	17	.....	.....
July	46½	40	[1]	[1]	120	75	30	17	.....	.....

[1] Prices fixed by Cotton Control Commission (see p. 28).

PRICES OF PIMA COTTON AT BOSTON.

In answer to an inquiry from the Tariff Commission, the Arizona Pimacotton Growers' Association wrote, under date of March 29, 1922:

"After having checked the quotations on Pima No. 2 from every source possible, we find that the following quotations, Boston basis, are the best available:

Month.	Cents per pound.	Month.	Cents per pound.	Month.	Cents per pound.
1917.		1919.		1921.	
October	70	May	43	March	29½
December	75	December	83	April	31
1918.		1920.		May	33½
January	77	January	97½	June	32
March	73	February	108½	July	33½
October	70½	March	110	August	33½
November	63½	May	125	September	39
December	60	November	45½	October	42½
1919.		December	38½	November	39
January	61	1921.		December	33
February	62	January	33¾	1922.	
April	48	February	29	January	38
				February	35
				March	36

TREND OF EXTRA STAPLE COTTON PRICES SINCE EARLY 1914, WITH REVIEW OF 1921.

[By Benjamin Adler, in Daily News Record of Jan. 6, 1922.]

The year 1921 had more than a sobering effect on prices of extra staple cotton, which began to recover from its wild orgy of speculation for the rise toward the autumn of 1920. Prices gave sign of receding to a lower level in June, 1920, and, after a few precipitous declines, duplicated in June and July their highs of the month of May. The strength during these two months was due to technical reasons, bears having been unwary of the negligible amount of certificated cotton in New York, and being called on to deliver what they had sold, were unable to accomplish it with the New York stock or to transport in time from the South for lack of facilities.

This artificial strength of the New York future market gave comfort to holders of extra staple cotton in the East and South. After the liquidation of the July positions,

at 43¾ cents per pound, the highest price for short cotton since the Civil War, prices began to tumble like a house of cards. The continued stressing of the weakness of sterling and of other foreign exchanges, with their subsequent collapse; the coal strike in England, attended by a shut-down of cotton mills in Manchester and Lancashire; the uncomfortable position of the banks which, due to a long period of cheap money, encouraged speculation; the industrial slow-down here; the debatable policy of the retired administration's campaign of warning the great buying public to tighten its purse strings, and the wholesale calling of loans which forced on an unwilling market warehouses full of merchandise and commodities. All these things were too much for cotton.

HOW SAKS SLUMPED.

In the New Bedford market prices between sales of extra staple cotton fell 15 to 20 cents a pound. From the high of $1.50 a pound for Egyptian Sakellarides, which this grade of cotton touched in June, 1920, prices already had fallen in November of the same year to 34 cents, and in March, 1921, could be bought at 20 cents.

Cotton of other growths fared no better. In the pell-mell of liquidation one unfavorable factor succeeded another. The 1920 crop of 13,400,000 bales of cotton came on the market at a time when its financing was well-nigh impossible. Its production had cost more than the price at which it could be marketed, therefore little of it had been hedged either by the banks or the growers, necessitating the carrying of the cotton or its sale at ruinous prices.

Exports of cotton were down to a minimum. To combat the unfavorable economic situation a policy of reduced acreage to cotton was adopted by the growers throughout the world. In Egypt it was commanded by the Sultan's decree. The use of fertilizer was cut 50 per cent.

FIRST CROP REPORT WAS DISCOUNTED.

Notwithstanding all these aids to higher prices, the first Government report of the crop in June, indicating an alarming reduction of acreage and the lowest condition report on record, the market did not respond to the figures. The world had already begun to discount an 8,000,000-bale crop, the smallest in many years, by offsetting it with an estimated carryover of almost 8,000,000, with world consumption of American cotton going at the rate of 10,000,000 bales a year.

Cotton had another sinking spell, and in June the lowest prices of the year were registered. To give an idea of the extent to which cotton had declined, 1 1/16-inch strict good ordinary cotton was sold in Fall River at that time as low as 6 cents per pound.

UPPERS TOUCHED 12¾ CENTS.

Egyptian uppers suitable for tire yarns sold as low as 12¾ cents, as against $1.20 the year before.

Peruvian mitafifi sold at 11 cents as against $1.15.

Brazilian 1 1/16-inch sold at 9 cents, compared to 80 cents.

In September alarming reports of boll-weevil infestation throughout the cotton-growing States caused a reversal of sentiment and a violent uprush started, carrying prices up almost $45 per bale in one month on the New York futures market alone.

Extra staples advanced by leaps and bounds. Though mills tried hard to maintain a hand-to-mouth buying policy, the shortage of good staple cotton and small stocks in spinning establishments rendered their position vulnerable. In September, Egyptian uppers had climbed to 44 cents, Sakellarides to 58 cents, Brazilians to 30 cents, and 1 1/16-inch Americans to 38 cents.

POSITION STRONG TO-DAY.

From these prices natural reactions have occurred, but prices have withstood pressure very well, indicating a very strong position. Cotton is very firmly held. Bulwarked by the knowledge of the shortage of desirable staple cottons, together with the fact that most long-staple producing countries are experiencing a deterioration in their growth, and that the tire industry, the chief users of staple cotton, are beginning to reawaken to renewed activity, the outlook for 1922 is encouraging.

Early 1914 pre-war prices, with short cotton selling around 12 cents.

Strict middling C
1 1/16-inch.....
1 1/8-inch.....
1 3/16-inch.....
1 1/4-inch.....
1 5/16-inch.....
1 3/8-inch.....

1919 cotton prices (cents per pound).

	January.	June.	August.	October.	Nove ber
American strict middling:					
1 1/16-inch	35	40	46	55	
1 1/8-inch	39	46	52	65	
1 3/16-inch	41	48	54	70	
1 1/4-inch	43	50	56	73	
1 5/16-inch	46	52	58	75	
P. Mitafifi	46	47	55	58	
American-Egyptian	58	59	67	68	
Sakellarides	60	60	70	70	
Uppers	45	48	56	60	.....
Brazilians	35	38	44	48	

1920 cotton prices (cents per pound).

	January.	May.	August.	Nove ber
American strict middling:				
1 1/16-inch	.....	60	.....	.....
1 1/8-inch	80	90	60	
1 3/16-inch	88	100	70	
1 1/4-inch	95	115	85	
1 5/16-inch	.....	.....	90	
P. Mitafifi	94	115	58	
American-Egyptian	100	125	72	
Sakellarides	105	150	75	
Uppers	.....	120	65	
Brazilians	75	80	50	

1921 cotton prices (cents per pound).

	January.	March.	August.	Septem-ber.*	Dec be
American strict middling:					
1 1/8-inch	20	18	18	34	
1 3/16-inch	22	20	22	38	
1 1/4-inch	24	22	24	40	
1 5/16-inch	26	24	28	43	
P. Mitafifi	20	18	17	30	
American-Egyptian	30	27	.....	40	
Sakellarides	33	28	32	45	
Uppers	22	20	18	32	
Brazilians	15	15	14	28	

Net imports of cotton, 1891–1921.

[Compiled from "Commerce and Navigation of the United States."]

Fiscal year.	Imports.		Reexports.		Net imports.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
1891	20,908,817	$2,825,004	447,794	$83,048	20,461,023	$2,741,956
1892	28,663,769	3,217,521	132,777	20,964	28,530,992	3,196,557
1893	43,367,952	4,688,799	360,832	51,814	43,007,120	4,636,985
1894	27,705,949	3,003,888	1,029,936	141,051	26,676,013	2,862,837
1895	49,332,022	4,714,375	771,614	70,546	48,560,408	4,643,829
1896	55,350,520	6,578,212	1,188,356	112,162	54,162,164	6,466,050
1897	51,898,926	5,884,262	1,188,523	114,768	50,710,403	5,769,494
1898	52,660,363	5,019,503	499,684	41,659	52,160,679	4,977,844
1899	50,158,158	5,013,146	293,988	31,147	49,854,170	4,981,999
1900	67,398,521	7,980,945	1,381,463	168,761	66,017,058	7,792,184
1901	46,631,283	6,787,828	306,452	41,358	46,324,831	6,746,470
1902	98,715,680	11,712,170	1,470,566	172,890	97,245,114	11,539,280
1903	74,874,426	10,892,591	1,475,494	189,786	73,398,932	10,702,805
1904	48,840,590	8,541,510	1,701,651	266,195	47,138,939	8,275,315
1905	60,508,548	9,414,750	650,294	79,727	59,858,254	9,335,023
1906	70,963,633	10,879,592	3,148,439	484,656	67,815,194	10,394,936
1907	104,791,784	19,930,988	10,836,241	1,366,478	93,955,543	18,564,510
1908	71,072,855	14,172,241	3,572,872	451,377	67,499,983	13,720,864
1909	86,518,024	13,622,802	1,515,871	204,120	85,002,153	13,418,682
1910	86,037,691	15,816,138	5,531,879	1,299,245	80,505,812	14,516,893
1911	113,768,313	24,776,320	2,332,679	452,938	111,435,634	24,323,382
1912	109,780,071	20,217,581	1,176,849	182,377	108,603,222	20,035,204
1913	121,852,016	22,987,318	871,145	129,747	120,980,871	22,857,571
1914	123,346,899	19,456,588	1,998,231	329,311	121,348,668	19,127,277
1915	185,204,579	23,208,960	13,570,362	1,541,979	171,634,217	21,666,981
1916	232,801,062	40,150,342	9,426,354	1,344,878	223,374,708	38,805,464
1917	147,061,635	40,429,526	1,960,995	423,482	145,100,640	40,006,044
1918	103,325,647	36,020,483	1,798,821	679,045	101,526,826	35,341,438
1919	103,592,194	37,633,612	2,249,977	904,753	101,342,217	36,728,859
1920	345,314,126	156,918,719	8,491,346	5,472,629	336,822,780	151,446,090
1921 [1]	125,938,754	44,666,171	7,917,637	3,948,939	118,021,117	40,717,232

[1] Includes 1,137,249 pounds, valued at $296,187, dutiable under emergency tariff act.

PRODUCTION, CONSUMPTION, EXPORTS, AND IMPORTS OF COTTON.

(Census Bulletin No. 147—Published in 1921.)

The table below shows the production of cotton, average net weight of bale, average value per pound, consumption of cotton and linters, exports of domestic cotton, and net imports of raw cotton from 1790 to 1920. The value of this table lies chiefly in its presentation for comparative purposes of relative quantities of each of the items shown for a series of years. The data here given can not be used for arriving at the aggregate supply and distribution of cotton and linters for a number of years, or even for a single year, as the table does not take into account stocks carried over, destroyed, or the balancing item shown on earlier pages.

PRODUCTION, CONSUMPTION, EXPORTS, AND NET IMPORTS OF RAW COTTON, FOR THE UNITED STATES: 1790 TO 1920.

Production.—The production statistics relate, when possible, to the year of growth, but when figures for the growth year are wanting, those for a commercial crop which represents the trade movement have been taken. The statistics of production for the years 1790 to 1898, inclusive, have been compiled from publications of the Department of Agriculture; for the years 1899 to 1920, inclusive, and for other years, when available, census figures have been used.

Price of upland cotton.—For the years 1910 to 1920, inclusive, the price per pound shown for upland cotton represents the average price received for cotton by the growers as computed by the Department of Agriculture; for the years 1902 to 1909, it is the average price of the average grade marketed in New Orleans prior to April 1 of the following year; for the years 1890 to 1901, inclusive, it is the average price of middling cotton on the New Orleans Cotton Exchange; and for the years 1790 to 1889, inclusive, it is taken from reports of the Department of Agriculture.

Consumption.—The statistics of consumption for the years 1790 to 1894, inclusive, have been compiled from publications of the Department of Agriculture, and those for the years 1895 to 1903, inclusive, from the reports of Latham, Alexander & Co. Census figures have been used for the years 1904 to 1920, inclusive, and for other years when available. The statistics relate to the 12 months during which the crop of the specified year was chiefly marketed, and not to the calendar year specified.

Domestic exports and net imports.—For the years 1790 to 1819, inclusive, the s
tics have been taken from American State papers, and for the years 1820 to 192
the reports on Commerce and Navigation of the United States, published b
Bureau of Foreign and Domestic Commerce, Department of Commerce. Fo
years 1790 to 1842, inclusive, the statistics of exports relate to the 12 months begi
with October 1 of the specified year; for 1843 to 1866, inclusive, to the 12 m
beginning with July 1; for 1867 to 1913, inclusive, to the 12 months beginning
September 1; and for 1914 to 1920 to the 12 months beginning with August 1.
statistics of imports relate to the same periods as the statistics of exports.

PRODUCTION, CONSUMPTION, EXPORTS, AND NET IMPORTS OF RAW COTTON
THE UNITED STATES: 1790 TO 1920.

| YEAR. | COTTON PRODUCTION (INCLUDING LINTERS). | | | | Consumption of cotton and linters (equivalent 500-pound bales).[1] | Exports of domestic cotton (equivalent 500-pound bales). | I
(eq
len
po
ba |
|---|---|---|---|---|---|---|---|
| | Running bales, counting round as half bales. | Equivalent 500-pound bales, gross weight. | Average net weight of bale (lbs.). | Average price per pound, upland cotton (cents). | | | |
| 1920 | 13,699,975 | 13,879,916 | 484 | 15.8 | 5,477,908 | 6,025,915 | 2 |
| 1919 | 11,920,625 | 12,028,732 | 482 | 35.4 | 6,807,817 | 6,760,887 | 6 |
| 1918 | 12,816,716 | 12,970,048 | 484 | 28.8 | 6,288,922 | 5,663,920 | 1 |
| 1917 | 12,344,664 | 12,428,094 | 480 | 27.1 | 7,555,191 | 4,587,000 | 2 |
| 1916 | 12,664,078 | 12,780,644 | 482 | 17.3 | 7,721,354 | 5,963,682 | 2 |
| 1915 | 12,012,813 | 12,122,961 | 484 | 11.2 | 7,326,598 | 6,405,993 | 4 |
| 1914 | 16,738,241 | 16,991,830 | 485 | 7.3 | 6,087,338 | 8,931,253 | 3 |
| 1913 | 14,613,964 | 14,795,367 | 484 | 12.5 | 5,942,808 | 9,256,028 | 2 |
| 1912 | 14,090,863 | 14,313,015 | 486 | 11.5 | 5,807,431 | 9,199,093 | 2 |
| 1911 | 16,109,349 | 16,250,276 | 483 | 9.6 | 5,400,005 | 10,681,332 | 2 |
| 1910 | 11,965,962 | 12,005,688 | 480 | 14.0 | 4,713,126 | 8,025,991 | 2 |
| 1909 | 10,385,209 | 10,315,382 | 475 | 14.3 | 4,759,364 | 6,491,843 | 1 |
| 1908 | 13,432,131 | 13,587,306 | 484 | 9.2 | 5,198,963 | 8,889,724 | 1 |
| 1907 | 11,325,882 | 11,375,461 | 480 | 11.5 | 4,493,028 | 7,779,508 | 1 |
| 1906 | 13,305,265 | 13,595,498 | 489 | 10.0 | 4,974,199 | 8,825,236 | 2 |
| 1905 | 10,725,602 | 10,804,556 | 482 | 10.9 | 4,877,465 | 6,975,494 | 1 |
| 1904 | 13,697,310 | 13,679,954 | 478 | 8.7 | 4,523,208 | 9,057,397 | 1 |
| 1903 | 10,015,721 | 10,045,615 | 480 | 12.2 | 3,980,597 | 6,233,682 | 1 |
| 1902 | 10,784,473 | 10,827,168 | 481 | 8.2 | 4,187,076 | 6,913,506 | 1 |
| 1901 | 9,748,546 | 9,675,771 | 489 | 8.1 | 4,080,287 | 6,870,313 | 1 |
| 1900 | 10,245,602 | 10,266,527 | 480 | 9.3 | 3,603,516 | 6,806,572 | 1 |
| 1899 | 9,507,786 | 9,459,935 | 476 | 7.6 | 3,687,253 | 6,167,623 | 1 |
| 1898 | 11,189,205 | 11,435,368 | 489 | 4.9 | 3,672,097 | 7,626,525 | 1 |
| 1897 | 10,897,857 | 10,985,040 | 482 | 5.6 | 3,472,398 | 7,811,031 | 1 |
| 1896 | 8,532,705 | 8,515,640 | 477 | 7.3 | 2,841,394 | 6,124,026 | 1 |
| 1895 | 7,161,094 | 7,146,772 | 477 | 8.2 | 2,499,731 | 4,761,505 | 1 |
| 1894 | 9,901,251 | 10,025,534 | 484 | 5.9 | 2,983,665 | 6,961,372 | |
| 1893 | 7,493,000 | 7,433,056 | 474 | 7.5 | 2,300,276 | 5,307,295 | |
| 1892 | 6,700,365 | 6,658,313 | 475 | 8.4 | 2,415,875 | 4,485,251 | |
| 1891 | 9,035,379 | 8,940,867 | 473 | 7.3 | 2,846,753 | 5,896,800 | |
| 1890 | 8,652,397 | 8,562,089 | 473 | 8.6 | 2,604,491 | 5,850,219 | |
| 1889 | 7,472,511 | 7,472,511 | 478 | 11.5 | 2,518,409 | 4,928,921 | |
| 1888 | 6,938,290 | 6,923,775 | 477 | 10.7 | 2,309,250 | 4,730,192 | |
| 1887 | 7,046,833 | 6,884,667 | 467 | 10.3 | 2,205,302 | 4,519,254 | |
| 1886 | 6,505,087 | 6,314,561 | 464 | 10.3 | 2,049,687 | 4,301,542 | |
| 1885 | 6,575,691 | 6,369,341 | 463 | 9.4 | 2,094,682 | 4,200,651 | |
| 1884 | 5,682,000 | 5,477,448 | 460 | 10.5 | 1,687,108 | 3,783,319 | |
| 1883 | 5,713,200 | 5,521,963 | 462 | 10.6 | 1,813,865 | 3,733,369 | |
| 1882 | 6,949,756 | 6,833,442 | 470 | 10.6 | 2,038,400 | 4,391,331 | |
| 1881 | 5,456,048 | 5,136,447 | 450 | 12.2 | 1,849,457 | 3,376,521 | |
| 1880 | 6,605,750 | 6,356,998 | 460 | 11.3 | 1,895,922 | 4,453,495 | |
| 1879 | 5,755,379 | 5,496,387 | 454 | 12.0 | 1,500,688 | 3,742,752 | |
| 1878 | 5,074,155 | 4,745,078 | 447 | 10.8 | 1,457,266 | 3,290,167 | |
| 1877 | 4,773,865 | 4,494,224 | 450 | 11.3 | 1,458,967 | 3,197,439 | |
| 1876 | 4,474,099 | 4,118,390 | 440 | 11.7 | 1,314,489 | 2,839,418 | |
| 1875 | 4,632,313 | 4,302,818 | 444 | 13.0 | 1,255,712 | 3,037,650 | |
| 1874 | 3,832,991 | 3,528,276 | 440 | 15.0 | 1,098,163 | 2,504,118 | |
| 1873 | 4,170,388 | 3,873,750 | 444 | 17.0 | 1,213,052 | 2,682,631 | |
| 1872 | 3,930,508 | 3,650,932 | 444 | 18.2 | 1,115,691 | 2,470,590 | |
| 1871 | 2,974,351 | 2,756,564 | 443 | 20.5 | 1,146,730 | 1,824,937 | |

[1] Data collected in running bales. Conversion based on average weights of bales produced, wh
the country are heavier than those consumed.

UCTION, CONSUMPTION, EXPORTS, AND NET IMPORTS OF RAW COTTON FOR THE UNITED STATES: 1790 TO 1920—Continued.

AR.	COTTON PRODUCTION (INCLUDING LINTERS).				Consumption of cotton and linters (equivalent 500-pound bales).[1]	Exports of domestic cotton (equivalent 500-pound bales).	Net imports (equivalent 500-pound bales).
	Running bales, counting round as half bales.	Equivalent 500-pound bales, gross weight.	Average net weight of bale (lbs.).	Average price per pound, upland cotton (cents).			
.....	4,352,317	4,024,527	442	17.0	1,026,583	2,922,757	1,802
.....	[2] 3,011,996	2,409,597	440	24.0	796,616	1,987,708	3,026
.....	2,366,467	2,198,141	444	29.0	860,481	1,300,449	1,870
.....	2,519,554	2,345,610	445	24.9	844,044	1,502,756	345
.....	2,097,254	1,948,077	444	31.6	715,258	1,401,697	[2] 1,035
.....	2,269,316	2,093,658	441	43.2	614,540	1,301,146	10,322
.....	300,000	299,372	477	83.4	344,278	17,789	68,798
.....	450,000	449,059	477	101.5	219,540	23,988	52,405
.....	1,600,000	1,596,653	477	67.2	287,397	22,770	67,695
.....	4,500,000	4,490,586	477	31.3	369,226	10,129	61,741
.....	3,849,469	3,841,416	477	13.0	841,975	615,032	.....
.....	[2] 5,387,052	4,309,642	461	11.0	845,410	3,535,373	.....
.....	4,018,914	3,758,273	447	12.1	867,489	2,772,937	.....
.....	3,257,339	3,012,016	442	12.2	550,708	2,237,248	.....
.....	3,093,737	2,873,680	444	13.5	761,614	2,096,565	1,678
.....	3,665,557	3,220,782	420	10.3	731,484	2,702,863	2,295
.....	2,982,634	2,708,082	434	10.4	641,391	2,016,849	4,425
.....	3,074,979	2,766,194	430	11.0	663,204	1,975,666	1,141
.....	3,416,214	3,130,338	438	11.0	736,458	2,223,141	1,423
.....	3,126,310	2,799,290	428	9.5	617,468	2,186,461	512
.....	2,454,442	2,136,083	416	12.1	422,626	1,854,474	330
.....	[2] 2,469,093	1,975,274	429	12.3	575,506	1,270,763	485
.....	2,866,938	2,615,031	436	7.5	586,032	2,054,204	22
.....	2,439,786	2,128,433	417	8.0	537,427	1,628,549	558
.....	1,778,651	1,603,763	431	11.2	385,916	1,054,440	122
.....	2,100,537	1,806,110	411	7.9	363,365	1,095,116	386
.....	2,394,503	2,078,910	415	5.6	337,730	1,745,812	[2] 680
.....	2,030,409	1,750,060	412	7.7	298,872	1,327,267	517
.....	2,378,875	2,045,481	409	7.2	278,196	1,584,594	1,835
.....	1,684,574	1,398,282	397	7.8	222,461	1,169,434	107
.....	1,634,954	1,347,640	394	9.5	245,045	1,060,408	1,210
.....	2,063,915	1,655,722	383	8.9	236,525	1,487,882	297
.....	1,360,532	1,092,980	384	13.4	221,738	827,248	319
.....	1,801,497	1,428,384	379	10.1	195,100	1,191,905	355
.....	1,423,930	1,129,016	379	13.2	176,449	888,424	[2] 510
.....	1,360,725	1,061,821	373	16.5	184,731	847,263	427
.....	1,253,406	962,343	367	17.4	166,523	774,718	1,574
.....	1,225,895	930,962	363	12.9	149,159	769,436	308
.....	1,114,286	815,900	350	12.3	142,352	649,397	69
.....	1,069,444	805,439	360	9.4	130,895	644,430	[2] 22
.....	1,026,393	732,218	341	9.7	129,938	553,960	22
.....	1,076,696	763,598	339	10.0	89,723	596,918	378
.....	953,079	679,916	341	9.9	84,788	529,674	[2] 40
.....	805,970	564,854	335	10.3	84,516	421,181	597
.....	1,057,402	732,218	331	9.3	103,535	588,620	74
.....	817,308	533,473	312	12.2	.....	409,071	79
.....	751,748	449,791	286	18.6	.....	352,900	26
.....	656,029	387,029	282	14.7	.....	286,739	932
.....	704,698	439,331	298	11.4	.....	347,447	110
.....	636,042	376,569	283	14.3	.....	289,350	[2] 196
.....	575,540	334,728	278	14.3	100,000	249,787	427
.....	632,576	349,372	264	17.0	.....	255,720	[2] 4,571
.....	445,429	261,506	280	24.0	.....	175,994	[2] 4,454
.....	465,950	271,967	279	34.0	.....	184,942	3,086
.....	439,716	259,414	282	26.0	.....	171,299	2,048
.....	369,004	209,205	271	29.0	.....	163,894	[2] 44
.....	254,545	146,444	275	21.0	51,778	165,997	[2] 265
.....	304,878	156,904	246	15.5	.....	35,458	101
.....	304,878	156,904	246	12.5	.....	38,220	3,133
.....	325,203	167,354	246	10.5	.....	57,775	897

[1] collected in running bales. Conversion based on average weights of bales produced, which for
ntry are heavier than those consumed.
ivalent 400-pound bales.
ss of exports of foreign cotton over total imports,

PRODUCTION, CONSUMPTION, EXPORTS, AND NET IMPORTS OF RAW COTTON FOR THE UNITED STATES: 1790 TO 1920—Continued.

YEAR.	COTTON PRODUCTION (INCLUDING LINTERS).				Consumption of cotton and linters (equivalent 500-pound bales).[1]	Exports of domestic cotton (equivalent 500-pound bales).	Net imports (equivalent 500-pound bales).
	Running bales, counting round as half bales.	Equivalent 500-pound bales, gross weight.	Average net weight of bale (lbs.).	Average price per pound, upland cotton (cents).			
1810	286,195	177,824	297	15.5	35,565	124,116	431
1809	328,000	171,548	250	16.0	33,473	186,523	[2] 560
1808	334,821	156,904	224	16.0	.....	101,981	[2] 1,601
1807	289,855	167,364	276	19.0	.....	21,261	6,297
1806	285,714	167,364	280	21.5	.....	127,889	1,485
1805	304,348	146,444	230	22.0	.....	71,315	961
1804	261,044	135,983	249	23.0	23,013	70,780	436
1803	222,222	125,523	270	20.0	.....	70,068	183
1802	231,092	115,063	238	19.0	.....	75,424	[2] 1,153
1801	210,526	100,418	228	19.0	.....	47,768	[2] 170
1800	153,509	73,222	228	44.0	18,829	41,822	8,606
1799	88,889	41,841	225	28.0	16,737	35,580	8,870
1798	66,667	31,381	225	44.0	.....	19,065	7,532
1797	48,889	23,013	225	39.0	.....	18,720	7,761
1796	44,444	20,921	225	34.0	.....	7,577	7,336
1795	35,556	16,736	225	36.5	.....	12,213	8,737
1794	35,556	16,736	225	36.5	.....	9,414	8,392
1793	22,222	10,460	225	33.0	.....	3,565	5,127
1792	13,333	6,276	225	32.0	.....	1,097	5,503
1791	8,889	4,184	225	29.0	.....	277	1,112
1790	6,667	3,138	225	26.0	11,000	379	697

[1] Data collected in running bales. Conversion based on average weights of bales produced, which for the country are heavier than those consumed.

[2] Excess of exports of foreign cotton over total imports.

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UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 28

HIDES AND SKINS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1922

UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 28

HIDES AND SKINS

WASHINGTON
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1922

UNITED STATES TARIFF COMMISSION.

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In the preparation of this report the Tariff Commission had the rvices of Frank A. Roper, Mark A. Smith, and Dr. Louis G. Connor the agricultural division of the Commission's staff, and of others.

HIDES AND SKINS.

Comparison of rates of duty.

	H. R. 7456 as amended by the Senate Finance Committee.	Act of 1913.	Act of 1909.	Act of 1897.
Cattle hides:				
Green	2 cents per pound	Free	Free	15 per cent.
Dried	4 cents per pound	do	do	Do.
Goat and sheep skins	Free	do	do	Free.
All other hides and skins n. s. p. f.	do	do	do	Do.

INTRODUCTION.

In the main, hides and skins are a by-product of the live-stock industry, and the supply is largely determined not by the demand for hides and skins but by the demand for the major live-stock products, such as meat, milk, or wool, and by the need for work animals. To the packer or butcher the hide is a joint product with the dressed carcass and its value, as well as that of the major product, influences the price which can be paid for the live animal.

Hides and skins are the chief raw materials for the leather industry, the value of the output of which in 1919 was third among the manufacturing industries in the United States. This country has grown to be the most important leather manufacturing and leather exporting nation of the world. Consideration of a duty on hides and skins, therefore, must keep in view its effect on the leather industry in both domestic and international trade.

This report is concerned with the following phases of the subject: (1) The supply of hides and skins and the relation of domestic production to consumption; (2) the position of the large packers in the hide and leather industry; (3) the relation between the price of hides and of live cattle and the probable effect of a duty in benefiting the cattlemen; (4) the tanning and leather industries, with especial reference to the probable effect of a duty on hides and skins upon the price of leather products as well as upon the export trade therein; and (5) compensatory duties.

USES.

The term "hides" is applied to the pelts of cattle, horses, and buffaloes; the term "skins" to those of calves, sheep, lambs, goats, kids, and in general to the pelts of all smaller animals.[1] Some kind of

[1] In commercial practice it is customary to treat pelts under 25 pounds in weight as skins and those 25 pounds and over as hides.

leather may be made from the pelt of most animals, but the produ varies greatly in its suitability for the widely different uses to whi leather is put. The different kinds of pelts, therefore, need separa consideration in connection with the tariff problems.

Hides are primarily the raw material of the tanner of heav leathers, the bulk of whose trade requires a tough, thick, and durab product. About 80 per cent of such leathers are used for the sol of boots and shoes and the remainder chiefly for a large class industrial leathers such as belting (used in the transmission o power), for harness and saddlery, and for some kinds of cases an bags. Thin, "spready" hides, measuring well over 6 feet acros the shoulders, are in demand for furniture and automobile upholstery.

The tanner of light leathers chiefly uses skins, since his trade re- quires a more pliable, soft, and light product. About 70 per cent of the light leathers are used for shoe uppers and most of the remainder for gloves, bookbinding, purses, bags, and fancy leathers. A lower- priced grade of light leathers is also produced by splitting cattle hides into two or more layers.

These, roughly, are the two distinctive branches of the tanning industry—the production of sole and other heavy leathers and of light leathers. According to the census of 1919, the total value of finished leather products was $1,500,000,000, of which boots and shoes constituted nearly 80 per cent. Harness and saddlery, trunks and valises, belting, and gloves formed most of the remainder. Since different kinds and grades of hides and skins are needed for the leather in these products and there are some differences in the preparation of the raw materials, which to some extent have distinct outlets and are subject to different degrees of foreign competition, a brief examina- tion of the character and sources of supply may indicate the char- acter of the tariff problems.

THE SUPPLY OF HIDES AND SKINS.

The supply of hides and skins is primarily determined by th demand for meats. The pelts are prepared in three different ways the method employed depending largely upon the distance to marke and upon transportation facilities. Roughly, they may be classifie in order of perishability as green or green salted, pickled, and dried Green or green salted, and pickled, are a product of large scale commercial slaughter, or of neighborhood slaughter in countries o areas which have local tanning industries or have good transporta tion facilities to hide markets. Dried hides and skins are chiefl the product of a more or less neighborhood slaughter in remot areas with poor transportation facilities to the markets. The im mediately effective supply from such areas, especially the mor remote, varies not so much with the current amount of slaughterin done as with the prices offered by local and regional buyers of hide and skins. The higher the price the more thorough the canvass b local dealers for these products. This is in sharp contrast with th normal marketing of green, green salted, or pickled pelts, which ar disposed of more or less as an incident to commercial slaughterin and meat packing.

Cattle hides constitute the bulk of the world's supply of hides an *skins.* They comprise at least 60 per cent of the total internationa

trade of approximately 2,000,000,000 pounds,[3] and a much larger proportion of the annual production. Calf and sheep skins constitute an additional 25 per cent of this total. Since the numbers of cattle and sheep have failed to keep pace with increases in population, and new uses for leather are constantly developing, there is a tendency toward an increasing shortage of hides and skins. The rapid development of substitutes undoubtedly has prevented an acute shortage.

The United States is the most important source of hides and skins, although production falls far short of domestic manufacturing requirements. Argentina is the leading exporting country; most of her product is exported to the United States and Europe, in spite of the fact that Argentina has a vast store of quebracho for tanning, which is also exported. Other important exporting countries include Australasia, Brazil, Uruguay, China, British India, Russia, and Mexico.

The number of cattle in the world reached the maximum thus far attained during the period 1905 to 1908; in the United States it was reached in 1907. Since then, in the face of a growing demand for leather, the number of cattle has been declining in the United States. This has been largely due to the limitation of range lands and the more intense competition between crops and live stock. During the war the number of cattle increased in this country, but it has declined since.

In the case of sheep the decline in world numbers has been much more pronounced. It set in about 1895. The maximum number of sheep in the United States seems to have been reached in 1884.

Despite a pronounced tendency in well-developed agricultural countries to market meat animals at earlier ages than formerly, the decline in numbers of cattle and sheep, through curtailment in supply, has resulted in an increase in the price of hides and skins out of proportion to increases in the prices of other commodities. The most marked increase occurred about 1909. From then through 1911 prices remained about the same. In 1912, 1913, and 1914 they advanced further, and during the war the increase was similar to that of most other products. Increased use of substitutes, especially rubber, cloth, and wood,[3] and to a lesser extent new sources of supply, such as skins from fish and sharks, have been restraining factors on increases in prices.

For the five-year period of 1909–1913 the amount of hides and skins entering international trade from *net exporting* countries was approximately 1,000,000,000 pounds [4] (dry and green added together in the condition as reported). Of this amount the United States imported slightly more than one-half. Two-thirds of the net exports were from Argentina, British India, Brazil, China, and Uruguay.

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[3] Average figure for 1909–1913, inclusive. See Yearbook, U. S. Dept. of Agr., 1920, p. 718.

[3] "Rubber, fiber, and wood are used for the heels of shoes, patented materials for soles, and cloth is substituted for the uppers and tops of shoes. For the upholstering of furniture and automobiles, in which the consumption of leather has been large, substitutes that are not leather at all have been invented and are in extensive use. Cotton is woven into belts for transmitting power; sheet iron, tin, and wood have displaced leather in trunk making; chair seats are now rarely made of leather; and straw, rattan, wood, and cloth are often used for making traveling bags and suit cases. Harnesses consume a large amount of leather, but in place of leather are found chains for traces, rope driving lines, cloth and fiber collars, and cotton saddle girths." (G. K. Holmes, in Yearbook, Dept. of Agr., 1917.)

In 1921 a notable increase in the use of rubber heels is noted. Rubber soles will outwear leather and will be much more widely used after further improvements now under way are concluded. (Boot and Shoe Recorder, September, 1921.)

[4] Net exporting countries shown in Yearbook, Dept. of Agr., 1917.

There is, however, a substantial export trade from nations whose production of certain classes is in excess of local demands or from nations which because of geographical limitations export from one section and import into another but which on the whole may be classed as importing countries.

To supply tanning needs the United States imports raw material from all corners of the world. Cattle hides come largely from Argentina, Uruguay, Brazil, and British India; calfskins from Europe; horsehides from Argentina and, formerly, from Russia; sheepskins mainly from New Zealand, Argentina, and Australia; and goatskins chiefly from British India, China, Africa, and Central America.

It would seem that the tariff problem chiefly concerns cattle hides. Table 1 shows that the annual American requirements of hides and skins, for the domestic and export trade in leather and its manufactures, is about 1,500,000,000 pounds (green basis),[5] of which slightly less than half, or about 700,000,000 pounds, is imported. Of the total domestic production of hides and skins in 1914, cattle hides constituted 84 per cent by weight, and 45 per cent of the total imports were composed of cattle hides. Calfskins represented 8 and 15 per cent of these totals; sheep and lamb skins comprised 5 and 14 per cent; horse, colt, and ass skins 2 and 3 per cent. Foreign sources supplied virtually all of our requirements of goatskins, 148,000,000 pounds, or 19 per cent of the total imports; all of the buffalo hides, i. e., 20,000,000 pounds, or 3 per cent, and also all of the kangaroo, wallaby, and miscellaneous skins. We produced 63 per cent of our consumption of cattle hides,[6] 34 per cent of the calfskins, only 28 per cent of the sheep and lamb skins, and less than 44 per cent of the horse and colt skins.[7]

In goat and miscellaneous skins there is virtually no tariff problem, for the reason that such skins sell at much higher prices than other kinds of hides and skins, are used for distinct purposes, such as glacé kid and fancy leathers, and the supply is entirely of foreign origin. Neither can the imports of horse, colt, and ass skins be said to create a tariff problem, for the domestic supply is purely a salvage from city and farm animals that have perished, is generally of a quality inferior to the imported, and the uses of such skins are, in the main, not closely competitive with cattle hides. Buffalo hides are used in connection with textile machinery, and also for lower-priced sole leathers. The supply is imported from British India, and is subject to British Indian export tax, higher to the United States than to the United Kingdom, and this tax, of course, is in effect an import duty so far as concerns the United States.

[5] Dried hides and skins converted to the green basis according to the ratio of 1 pound of dried to 2 of green.

[6] In this connection it should be noted that each year more than 2,000,000 cattle and 1,000,000 sheep in the United States die from disease, exposure, and old age. (Estimates by the Bureau of Crop Estimates, U. S. Department of Agriculture.) When prices warrant, fully 90 per cent of these animals are skinned and the hides marketed. When prices are depressed, less than 50 per cent of such hides and skins are saved, and a large number are handled in a careless manner and must be used for glue stock. In so far as an import duty might raise the market price, the recovery of this raw material would be encouraged and result in some benefit to stockmen. To a certain extent this applies also to horse, mule, colt, and calf hides and skins. Additions by this means could easily add 6 to 8 per cent to total domestic production of hides and skins suitable for tanning, almost entirely of cattle hides. Thus, "Prices (in 1921) were reduced to levels of 1893, 1894, and 1895, and with high freight rates it was almost impossible for farmers to ship hides last winter, as the freight on them was as much as the value of the hides themselves, so that thousands of hides, not only in Nebraska but all over the Western States, went to waste last year. None of the dead animals were skinned. The only hides that were taken off were taken from butchered animals. * * * The price of shoes and other leather seemingly stayed at fairly high prices, while it was almost impossible to sell a hide for anything. This seemed unreasonable, of course, to the farmer and stockman, so they did not buy anything in leather goods that they did not absolutely have to have. * * * Hide prices will depend a great deal upon our foreign trade. If foreign demand opens up for hides and leather, our *prices, of course,* will advance." Daily Drovers' Journal. (Stockman, South Omaha, Nebr., Jan. 2, 1922.

[7] *See Table I, p. 5* and Table 5, p. 14.

TABLE 1.—*Domestic production and imports of hides and skins.*

[Converted to a green basis, 1 pound of dry to 2 pounds of green.]

	Domestic production (estimated).	Imports.[1]
1914.	*Pounds.*	*Pounds.*
Cattle hides (50 pounds)[2]	600,512,000	351,232,000
Calfskins (12 pounds)[2]	55,937,000	[4] 110,134,000
Sheep and lamb skins (2 pounds)[2]	38,843,000	101,055,000
Horse, colt, ass skins (30 pounds)[2]	15,500,000	20,058,000
	710,792,000	582,489,000
Buffalo hides		29,162,000
Goatskins (1¼ pounds)[2]	748,000	147,925,000
Kangaroo and wallaby skins		1,332,000
All other hides and skins (exclusive of furs)		6,180,000
Total	711,540,000	767,088,000
1920.		
Cattle hides (50 pounds)[2]	673,676,000	334,475,000
Calfskins (12 pounds)[2]	115,954,000	52,035,000
Sheep and lambskins (2 pounds)[2]	29,719,000	112,523,000
Horse, colt, ass skins (30 pounds)[2]	[4] 36,000,000	21,890,000
	855,349,000	520,923,000
Buffalo hides		20,727,000
Goatskins	181,000	150,674,000
Kangaroo and wallaby skins		1,389,000
All other hides and skins (exclusive of furs)		7,000,000
Total	855,530,000	700,113,000
Average of 1914 and 1920	783,535,000	733,600,000

[1] Fiscal year 1914; calendar year 1920.
[2] Per hide or skin.
[3] Includes kipskins—yearling and small cattle hides.
[4] Production for 1919.

Our extensive import trade in the raw material is counterbalanced to a certain extent by exports of leather products. Were we to depend exclusively on the domestic market, our own production of hides and skins would supply about two-thirds of that need. There would, of course, be a serious deficiency in certain classes of hides and skins, such as goatskins for the glazed-kid industries and heavy cattle hides for sole leather. Aside from these, our shortage, while less severe, largely affects all classes. Beginning in 1914 there was for a time a shortage of first-class calfskins, owing to the curtailment of European exports, but the domestic supply practically doubled by 1919, and thus offset the decrease in imports. More recently a decrease in the domestic supply coincides with an increase in imports from European sources.

THE PACKERS AND THEIR RELATION TO THE HIDE AND LEATHER INDUSTRY.

Normally, before reaching the consumer hides and skins now pass through the following hands:

I. Cattle producer,
II. Packer and butcher,
III. Tanner,
IV. Leather manufacturer,
V. Merchant—wholesale and retail,
VI. Consumer.

The tendency toward combination of the various stages has increased rapidly in the last decade. The braces indicate actual

combinations now in practice.[8] The packer and tanner combines have become so strong that independent tanners are finding it expedient to encourage combinations with leather manufacturers, and in many instances with the succeeding stage, that of merchandizing finished products. It is interesting to note that there has been no movement by the producers of the raw material toward the processing of their product. Heretofore this has been left entirely to the intermediary agents.

Hides and skins are the most important by-products of the meat-packing industry; in the case of cattle about 6½ per cent of the live weight consists of hides, and about 11 per cent of the value of the live animal is in the hide. Since these by-products deteriorate and lose much of their value if not properly cared for, the packers found it advantageous to tan their own output. Having first entered the tanning business for this reason, they expanded it to the point where they now handle a part of the hides and skins from other sources, and also frequently sell a part of their own "take-off."

In 1916 about 55 per cent of the cattle, 30 per cent of the calves, and 68 per cent of the sheep were slaughtered by the large packers.[9] Through their subsidiaries or through leases and contracts, it is estimated that they tan approximately 25 per cent of the total leather produced in the United States. In certain classes of sole leather they tan as much as 50 per cent.[10] Their position in the hide and leather industry is further strengthened by the fact that their hides receive a higher grading than those of smaller packers and butchers, which are arbitrarily classed as "country hides." Through their foreign establishments they also control a certain share of the imported hides. Since 1916 the packers' position has undoubtedly been strengthened, especially during the price depression of 1920–21 and restriction of credit, owing to their strong financial position as contrasted with the weaker position of the small tanners.

It is also probably true that the operations of the packer-tanner, because of his large supply of high-grade hides, tends to stabilize the market price of hides, for if the independent tanner will not offer for the hides and skins as much as the packer believes them to be worth the packer will tan them through his own plants or have them tanned on contract outside.

In this connection the position of the packer may be contrasted with that of small butchers and local packers. Hides removed by

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[8] A few years ago some of the larger packers contemplated following their products through to the ultimate consumer. Investigations conducted under the Sherman antitrust law and the more recently enacted Federal supervisory legislation have undoubtedly delayed this movement for the present at least.

[9] Report of Federal Trade Commission on Meat-Packing Industry, Vol. I, p. 106.

[10] In sheep and lamb shoe stock the packer tanners combined have 44 per cent of the country's total production; in 1916 sheep and lamb glove stock, 17 per cent; in shoe stock tanned from calf and kip and all skins other than sheep and lamb, goat and kid, they have 11 per cent; and in other leather (except glove stock), tanned from such skins, they have 25 per cent. In shoe stock from cattle sides they have 12½ per cent of the country's total; in harness, 9 per cent; strap, 45 per cent; belting, 21 per cent; sole, 22 per cent and finished splits, 13 per cent. In most of these kinds of leather the packer tanners are larger producers, as a group, than the Central Leather Co. and the American Hide & Leather Co. combined. The latter companies do not produce any leather in some of these lines and surpass the packers in only 3 out of the 10 kinds listed, viz, in shoe stock, etc., from cattle sides (13.71 per cent to the packers' 12.56 per cent); harness (where they produce 30 per cent to the packers' 9); and sole (where the Central Leather Co. produces 32 per cent to 22 per cent for the packers.)

Four packers, together with the two other largest companies in the industry, have 54 per cent of the country's sole leather; 49 per cent of the strap leather; 39 per cent of the harness leather; 35 per cent of the belting; 44 per cent of the sheep and lamb shoe stock; and smaller but nevertheless important percentages of other kinds.

The above figures include leather produced by companies for themselves in their own tanneries and that tanned for them on commission by others.

(Report of Federal Trade Commission on Meat-Packing Industry, June 24, 1919, Vol. I, p. 200.)

ost of the latter, and by all of the former, are classed as country des, which also include those removed by farmers and ranchers. fact, country hides may fairly be taken as a trade name for those moved in establishments not subject to Federal inspection. Such des, therefore, constitute about 40 per cent of those produced in e United States during recent years, and approximately 25 per nt of the consumption. However, the importance of country des in domestic consumption is much smaller than these per-ntages would indicate. A considerable proportion of these hides ve knife cuts and gashes, which detract from their value and in-ease waste, and also have blood and other stains which mar their e-taking properties. They frequently are imperfectly cured and ored, and are rarely on the market in sufficiently uniform grades to ermit careful selection in desired quantities. For the foregoing asons, and because of the necessity for greater handling, both by rge sellers in the markets, and at tanneries, the price of country des is depressed considerably below that of packer hides by an verage of about 20 per cent on a normal market, much more during eriods of depression.[11] However, there is a fairly constant normal elation between the prices of these two main divisions, and any ffect which the large packers may have on the hide markets would eem to be reflected almost immediately in case of country hides nder normal market conditions.

The question next arises as to whether the independent tanner ould be at a disadvantage, compared with the packer-tanner, in ase a duty should be levied on hides and skins.[12] Since cattle hides redominate in production and consumption, and constitute 50 per ent or more of total imports, the effect of a tariff would be more oticeable in the case of such hides than with respect to other hides nd skins. The following discussion in this section therefore may roperly be confined to cattle hides. Inasmuch as about 35 per ent of the total supply of cattle hides are imported, it seems fairly ertain that American hides should, in the long run, gain approxi-nately the full amount of any duty which may be levied. It should e remarked, however, that if the packers did not pass the duty on o the live-stock producers, they, the packers, would have a great dvantage over the independent tanner. Some further data bear-ng on the question are presented in the next section.

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[11] See Table 2, p. 8.

[12] The subject of cost accounting methods among the packer-tanners appears to have caused considerable oncern to the independent tanners, some of whom allege an overcharge to the meat account, on packe-s' ides, in order to lessen the charge against hides. The usual practice seems to be an allocation of the urchase price of live cattle to meat, hide, and offal accounts on the basis of market prices for each com-odity on the day the cattle are butchered. The following quotation touches the subject:

"The serious drop in values of hides, wool, and other by-products in 1920 necessarily was reflected in e animal values. Thus while the average wholesale selling prices * * * of the main products have o fallen during 1920, the prices of dressed beef and dressed mutton have not dropped as much propor-ionately as the prices of live cattle and live sheep * * *. It is not generally realized how important effect by-product values have on prices of live stock. In the first place, the returns from by-products included when we figure our profit on meat. In computing the profit on cattle, for example, the re-rns from cured hides, * * * are taken into account * * *. Since the returns from by-products included in figuring our profits on meat, the prices that we get for these by-products have an important ring on prices and profits. When we buy live cattle, for example, we base our bids on what we think are going to get for the beef and by-products. The beef itself is sold within a couple of weeks after the mals are bought. We know daily what beef is selling for, although we can not foretell what it will g. Hides, however, have to be cured for a month or more, and by the time they are finally sold it y be two, three, or more months after the animals have been bought. An increase in hide prices, there-e, means larger profits on cattle than we anticipated at the time of purchase. A decrease in prices has opposite effect and often results in our beef business showing a loss."—(Swift & Co., 1921 Yearbook.)

THE RELATION OF THE PRICE OF HIDES AND DRESSED BEEF TO T OF LIVE CATTLE.

The relative values of dressed meat, hides, and other by-prod may vary considerably from time to time, according to the chan supply of, and demand for, the respective products. However order to give a rough indication of a normal situation, it may said that the meat-packer obtains about 79 per cent of his t returns of the beef-packing end of his business from the dres meat carcass, 11 per cent from the hide, and about 10 per cent fr a large number of minor products, such as tallow, oleo oil, stea casings, and the like.

A comparison of average yearly wholesale prices for a period five years (1912–1916) covering green salted, packers' heavy, nat steer hides, good to choice steers, and good native steer carcass b all in the Chicago market, shows that while the price of dres carcass beef in the Chicago market increased but 3.8 per cent, price paid for good native steers increased 14.3 per cent. (Table 2, following.) This was made possible almost entirely thro the rise in price of hides, which was 48.9 per cent, and the incre in price of tallow and other by-products.

A comparison for a period of nine years (1908–1916) brings the same relationship. In this instance the price of dressed b increased 31.4 per cent, the price of live cattle 60 per cent, and price of hides 95 per cent. For a 14-year period (1908–1921), price of dressed beef increased 122 per cent, the price of live ca 192 per cent, and the price of hides 193 per cent.

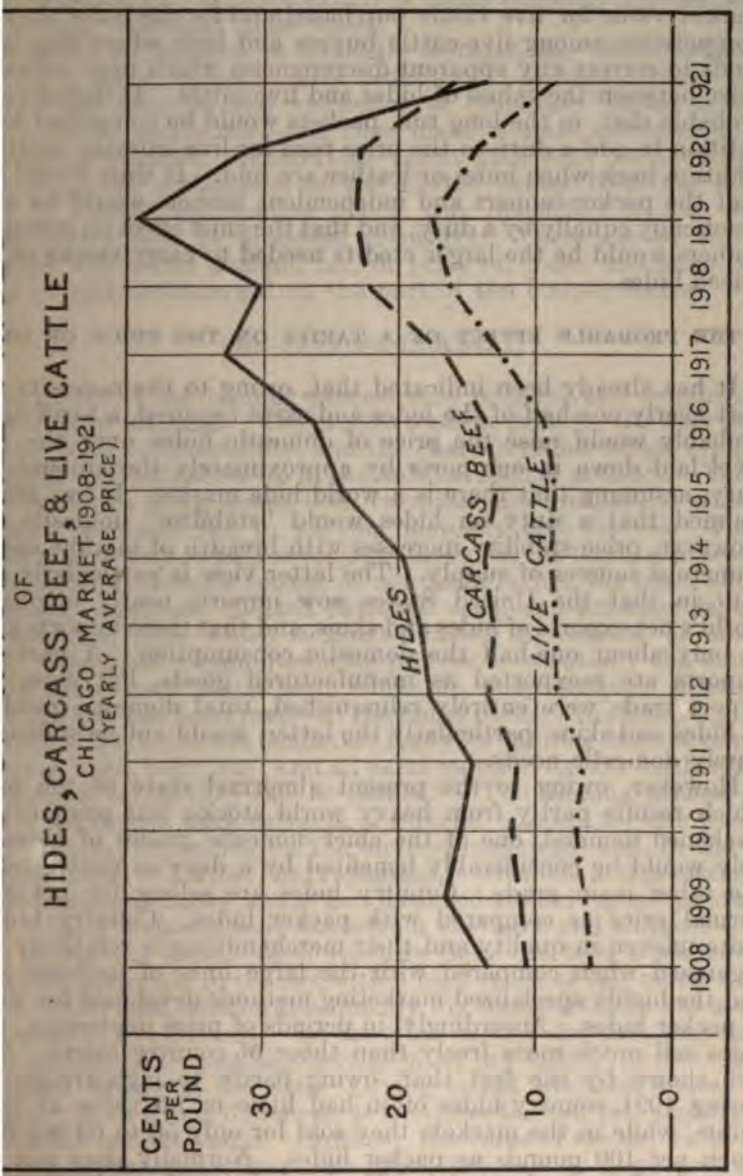
In the decline from the high point in 1919 through 1921, the p of hides declined 65 per cent, the price of live cattle 50 per cent, the price of carcass beef 30 per cent. Table 2 presents the forego in tabular form. The figure on the opposite page portrays the sa data graphically.

TABLE 2.—*Average yearly prices of hides, live cattle, carcass beef, Chicago market, 1 1921.*

[Bureau of Labor Statistics.]

Year.	Hides—green, salted, packers' heavy, native steers.		Live cattle, steers, good to choice.		Carcass beef, native steer	
	Per pound.	Relative to 1913.	Per pound.	Relative to 1913.	Per pound.	Rel to 1
	Cents.	*Per cent.*	*Cents.*	*Per cent.*	*Cents.*	*Per*
1908	0.134	72.6	0.060	70.5	0.105	
1909	.165	89.6	.065	75.9	.110	
1910	.155	84.1	.070	82.5	.115	
1911	.148	80.3	.057	79.1	.112	
1912	.176	95.7	.084	98.8	.133	
1913	.184	100.0	.085	100.0	.130	
1914	.195	105.7	.090	105.2	.133	
1915	.242	131.6	.087	102.3	.129	
1916	.262	142.4	.096	112.5	.138	
1917	.327	178.0	.128	150.6	.167	
1918	.391	163.8	.164	193.1	.221	
1919	.393	213.8	.175	205.7	.233	
1920	.312	169.6	.148	174.1	.230	
1921	.139	75.5	.087	102.3	.163	

he long run, therefore, higher hide prices, like higher beef —only to a lesser extent—mean that higher prices can be paid e cattle. Though temporary or short time variations, arising ocal or other conditions, may cause the price of hides to move



y and the price of live cattle in the opposite direction, never- over a period of years the two price curves show a fairly elation.[13] On the basis of yield, a 1,000-pound steer of fair

ression in the hide market such as has occurred during the past year is reflected in a reduction in f live cattle, or an increase in the selling price of the dressed meat, or sometimes both. Conversely, e in the price of hides means a lowering of the selling price of dressed beef, or an increase in the the producer for the live animal, or both.

average quality will yield about 550 pounds of dressed carcass and 60 pounds of green hide. An increase of 1 cent per pound in the price of hides is equal to a credit of about 11 cents per 100 pounds on the dressed beef, or 6 cents per 100 pounds on the live weight."

Briefly, then, there appears good reason to believe that competitive buying in the live-stock markets forces the packers to pay the true market value for live cattle purchased and for the hides they carry. Competition among live-cattle buyers and hide sellers thus quickly tends to correct any apparent discrepancies which may occasionally exist between the values of hides and live cattle. It therefore seems probable that, in the long run, packers would be compelled by competition to add a duty to the price paid for live animals, getting this addition back when hides or leather are sold. It thus would appear that the packer-tanners and independent tanners would be affected practically equally by a duty, and that the chief effect on independent tanners would be the larger credits needed to carry stocks of higher priced hides.

THE PROBABLE EFFECT OF A TARIFF ON THE PRICE OF HIDES.

It has already been indicated that, owing to the necessity to import nearly one-half of the hides and skins required, a tariff on hides probably would raise the price of domestic hides over the foreign level laid down in our ports by approximately the amount of the duty, assuming that there is a world hide market. It has also been claimed that a duty on hides would "stabilize" domestic prices. However, price stability increases with breadth of market and more numerous sources of supply. The latter view is particularly significant in that the United States now imports nearly one-half the world's net exports of hides and skins, and that these imports amount to only about one-half the domestic consumption. A part of the imports are reexported as manufactured goods, but even if this export trade were entirely relinquished, total domestic production of hides and skins, particularly the latter, would not be sufficient for purely domestic needs.

However, owing to the present abnormal state of the market, which results partly from heavy world stocks, but primarily from slackened demand, one of the chief domestic grades of hides probably would be considerably benefited by a duty as contrasted with the other main grade. Country hides are selling far below their normal price as compared with packer hides. Country hides are quite uneven in quality and their merchandising is relatively poorly organized when compared with the large lines of uniform grades and the highly specialized marketing methods developed for disposal of packer hides. Accordingly, in periods of price depression, packer hides sell much more freely than those of country origin. This is well shown by the fact that, owing partly to high freight rates during 1921, country hides often had little or no value at country points, while in the markets they sold for only 50 to 60 per cent as much per 100 pounds as packer hides. Normally they sell for 80 per cent of the packer price. The immediate effect of a duty prob-

"Whalin, C. V.: U. S. Bureau of Markets.

bly would be a temporary restriction of imports. Heavy stocks on hand in the United States should then move more freely, and country hides should be in greater demand than at present. Their price then should rise, relative to packer hides, until approximately the normal price relation was reached. Beyond that they could hardly be expected to go. To that extent it could probably be said that a duty would "stabilize" hide prices.

Assuming no increase in domestic demand, the chief permanent effect of a duty, unless it were prohibitory, probably would be to increase the removal and marketing of domestic "fallen" hides—from animals which die—and thus make a small addition to the domestic production. Should the result of a duty be such as to cause a partial withdrawal of the United States from the export trade in leather and leather goods, this deficiency in the world supply would soon be produced elsewhere. There should be little effect on the world demand for, or price of, hides and skins as a result of such withdrawal on the part of the United States.

THE TANNING INDUSTRY.

The object of the tanning process is to preserve and lengthen the life of the raw material. The process tends to preserve the fiber rather than to change it chemically, and the characteristics which are present in the raw hide show up in the finished leather product. Though some processes bring about both chemical and mechanical changes, different processes tan in varying manners and degrees. This is largely due to skill, which is very important in the tanning process.

The skins of animals consist of two main layers, the outer skin or epidermis, composed of hard flattened cells, and an inner layer of soft spherical cells, which is usually called the corium, or mucous layer. The leather-manufacturing process is essentially the conversion of the corium into a hard, workable, nonputrefiable substance. After the hair has been removed the finest parts of the hide, e. g., the back and sides (butts and bends) are ready for tanning, but the remaining parts, neck, belly, etc., and all parts required for soft leather, must be softened before they can be tanned.[15] The tanning process consists of soaking in bark extracts or mineral tannage for one week to three months, depending on the method employed, and, in the case of many kinds of leather, impregnating it with oils and greases.

The tanning industry was at first localized around regions producing bark. Later, extracts were made from the bark and shipped to the place of origin of hides. More recently there has been a tendency to ship both materials to centers within easy reach of the market. As bark is bulky and deteriorates quickly, its transportation has always been more or less difficult. On the other hand hides and skins can be cured and salted by pickling in brine or by dry salting, or if necessary by simple drying in the sun. Drying is not advisable unless it is necessary to ship long distances, as it injures the raw pelt slightly and reduces its market value. However, the value of the dry hides is so high in proportion to their bulk that they can be more profitably carried longer distances than pickled or green. Consequently they have always been a great trading asset for economically retarded

nations or countries difficult of access. From most remote regions and distant inland points hides and skins enter the channels of trade.[16]

Mineral tanning, especially chrome, has materially benefited the light leather industry. Goatskins, the principal raw material for chemical tanners, are nearly all imported. The fact that a port city makes a desirable place for the localization of this industry and the fact that the industry started in Philadelphia have made it and the surrounding region the greatest center for chrome-tanned leather in the world.

Despite the many kinds of leather, the bulk of the product is composed of two standard kinds—heavy and light, or sole and upper. Heavy leathers are made almost entirely by tanning with the bark of wood, of oak, hemlock, or quebracho, while light leathers, once made the same way, are now more often manufactured by a mineral process, generally referred to as the chrome process. To this generalization there are some minor exceptions; for example, Great Britain, lacking the forests of the Americas or central Europe, imports a variety of tanning material ranging from the nibs of acorns to Italian sumac, while France, a specialist in high-grade light leather, forsakes in many of her plants the technical "tanning" process and adopts instead "tawing," changing the skins to leather by means of alum and salts, or combinations of alum, salts, fats, albumens (egg), and oils. In the main, however, the tanning industry is supported by hides or skins transformed into leather by vegetable tans[17] for the heavy leathers and chrome tanning for the light leathers.

In Table 3 is given the numbers of hides and skins used in tanneries in the United States for the three periods 1909, 1914, and 1919. The number of hides tanned has increased about 20 per cent from 1909 to 1919, while the number of skins treated has decreased about 20 per cent for the same period. In the last-mentioned group goat and kid skins showed a substantial increase, amounting to about 15 per cent.

In general, about 65 per cent of the consumption of our tanneries are cattle hides, 10 per cent calfskins, 10 per cent goatskins, 10 per cent sheep and lamb skins, 3 per cent horse, mule, and colt hides and skins, and 2 per cent miscellaneous.

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[16] Matthews: Commerial Commodities.
[17] Keir, Malcolm: Manufacturing Industries in America.
[17] Ibid.

TABLE 3.—*Raw hides and skins used in tanneries in the United States, 1909, 1914, and 1919.*

[From Federal Census.]

	1909	1914	1919
HIDES (PURCHASED).			
Total:			
Number	20,516,332	20,867,820	24,933,895
Cost	.....	.....	$320,916,283
Cattle:			
Number	18,613,054	17,776,538	22,184,517
Cost	$121,266,814	$151,609,541	$304,994,752
Horse:			
Number	(1)	1,250,245	2,294,308
Cost	(1)	$4,036,633	$12,954,273
Other:			
Number	.....	.....	455,070
Cost	.....	.....	$2,967,258
SKINS (PURCHASED).			
Total:			
Number	125,812,254	117,679,872	98,847,901
Cost	.....	.....	$195,621,577
Calf and kip:			
Number	19,735,549	16,067,793	12,894,274
Cost	$31,798,263	$33,117,713	$74,334,355
Goat and kid:			
Number	48,193,848	37,755,867	55,428,830
Cost	$27,928,019	$23,916,965	$82,500,845
Sheep and lamb:			
Number	26,148,336	40,364,926	22,766,247
Cost	$12,268,487	$19,339,258	$29,415,744
Other:			
Number	3,797,634	1,328,540	7,758,550
Cost	$3,802,491	$4,377,496	$9,370,633
Grand total, value	.....	.....	$516,537,860

[1] Separate figures not available.

LEATHER MANUFACTURES.

According to the census of 1919 the purchased value of hides and skins used in the manufacture of leather was $516,537,860, the value of the leather produced was $928,591,701, and the value of partly manufactured and completely manufactured products was $1,686,042,659.

Boots and shoes represented 79.3 per cent of the total value of all finished leather products in 1919; harness and saddlery, 5.7 per cent; trunks and valises, 4.4 per cent; belting leather, 2.8 per cent; gloves and mittens, 3.2 per cent; and all other leather manufactures, 4.6 per cent.

For the years 1917, 1918, and 1919, 81 per cent of the total leather production reported in pounds (sole leather) and 68 per cent of the production in feet (upper leather) were used in the manufacture of shoes, according to reports of 319 tanning companies.[18] As these companies manufactured most of the shoe leather made in the United States, a fair indication is given of the quantity of leather going into shoes.

[18] Data from Federal Trade Commission.

TABLE 4.—*Value of production of finished leather manufactures and of leather and partly manufactured leather products.*

[From Federal Census.]

	1914		1919	
	Value.	Per cent of value.	Value.	Per cent of value.
Raw material, leather, tanned, cured	$367,201,705	.....	$928,591,701	.....
Partly finished:				
Boot and shoe cut stock	59,964,523	.....	161,203,310	.....
Boot and shoe findings	28,303,186	.....	62,666,408	.....
Total	88,267,709	.....	223,869,718	.....
Finished:				
Boots and shoes	501,760,458	77.3	1,159,171,395	79.3
Saddlery and harness	53,558,612	8.3	83,699,050	5.7
Trunks and valises	26,471,527	4.1	63,920,516	4.4
Belting leather	23,035,951	3.6	40,540,653	2.8
Gloves and mittens, leather	21,614,109	3.3	47,181,299	3.2
Other leather goods	22,684,486	3.4	67,660,028	4.6
Total	649,125,143	100.0	1,462,172,941	100.0

EXPORTS OF LEATHER AND MANUFACTURES OF LEATHER.

Exports of leather and its finished manufactured products greatly increased during the war. The total value of all exports amounted to $60,757,000 in 1912. In 1914 they were $57,566,000 and in 1920 reached their maximum, $291,801,000. The average for the 10-year period of 1912-1921 was $127,721,000. The average annual export for the pre-war period 1910–1914 was $57,707,239; for the war period 1915–1919, $140,996,981; and for the post-war period 1920–21, $195,004,442.

Of total exports the most important items are upper leather (calf, kip, goat, and kid, mostly the last two named) and sole leather. Upper leathers comprised 35 per cent of the value of all leather products exported, or $44,690,000 for the 10-year average 1912–1921, while sole leather comprised about 16 per cent, or $21,450,000. The average annual pre-war export of upper leather for the period 1910–1914 was $25,400,180; for the war period, $44,301,094; and for the post-war period, $74,725,933. Exports of upper leather and sole leather are for the most part shipped to Europe, notably the United Kingdom, for reexport to the Continent. For sole leather, average annual exports were $8,567,609 for the period 1910–1914; $27,327,189 for 1915–1919; and $20,819,527 for 1920–21.

Next in importance are boots and shoes. Exports of all leather boots, shoes, and slippers were 7,257,000 pairs valued at $12,408,575 in 1910, and 10,205,000 pairs valued at $18,230,000 in 1914. The 10-year average 1912–1921, inclusive, was 14,479,384 pairs valued at $37,007,000, or 29 per cent of the value of all leather exports. Average annual exports for 1910–1914 were 15,788,395 pairs of shoes valued at $15,788,395; for 1915–1919, 16,322,313 pairs valued at $38,785,275; and for 1920–21, 16,643,417 pairs valued at $61,677,256. The average is less than 5 per cent of total domestic production and the maximum is less than 7 per cent. Exports of boots and shoes are mostly to South and Central America, Cuba being our best customer.

Other items in our export trade include belting, patent leather, and many other unspecified items. The total of this miscellaneous group is less than 20 per cent of the value of all leather and leather products exported.

IMPORTS AND EXPORTS OF HIDES AND SKINS AND EXPORTS OF LEATHER PRODUCTS.

For the 5-year period 1910–1914 the value of the imports of the raw material was $104,632,000, while the exports of leather and leather manufacturers were valued at $57,707,000. During the war the value of exports greatly increased, while the value of imports increased much less. The average value of imports for the period 1915–1919 was $152,039,000 and for the exports $140,997,000. (See Table 5.)

TABLE 5.—*Production, imports, and exports of all hides and skins, and exports of leather and leather manufactures, 1910–1921.*

Fiscal year.	Domestic production, hides and skins.	Imports for consumption, hides and skins.[1]		Domestic exports, hides and skins.	Domestic exports of leather and leather manufactures.
		Quantity.	Value.		
	Pounds.	*Pounds.*		*Pounds.*	
1910		632,050,570	$115,365,882	14,635,075	$52,646,755
1911		373,457,317	70,506,733	44,594,235	53,673,056
1912		546,663,378	102,371,585	25,246,800	60,756,772
1913		584,929,352	117,275,007	26,130,338	63,893,351
1914	[2] 711,540,000	551,290,256	117,639,905	19,867,135	57,566,261
1915		538,809,820	104,188,187	24,933,180	120,727,156
1916		743,090,431	158,838,112	17,122,019	146,703,815
1917		710,801,551	216,474,281	9,971,249	153,709,573
1918		432,097,029	131,431,180	12,144,817	100,880,843
1919		448,144,652	149,268,316	14,772,720	182,963,517
1920	[2] 855,530,000	798,446,952	376,892,462	24,006,361	291,800,591
1921		[3] 352,169,897	[3] 105,989,967	15,306,567	98,208,294

[1] Dried and green.
[2] Based primarily on slaughter figures for calendar years.
[3] General imports.

THE RELATION OF THE PRICE OF HIDES AND SKINS TO THE MANUFACTURED PRODUCTS.

The wide disparity between the price of hides and skins and the price of shoes, the present price of the latter being twice the pre-war price, while the former is less than the pre-war price, raises a question of prime importance in connection with a duty on hides. In January, 1920, the price of green salted packer's heavy native steer hides at Chicago was 218 per cent of the 1913 average price. In Boston the wholesale price of men's vici-calf blucher was 298 per cent of the 1913 average price. The situation one year later (January, 1921) shows hides at 91 per cent of the 1913 price, while shoes are at 233 per cent. The situation two years later (January, 1922) was 90 per cent of the 1913 price for the hides and 215 per cent for the shoes.

TABLE 6.—*Wholesale prices of hides, leather, and shoes.*[1]

Year and month.	Wholesale prices[2] (index numbers).				
	Hides.		Leather.		Boots and shoes, men's vici-calf blucher (Boston), relative to 1913.
	Green salted packer's heavy native steers (Chicago), relative to 1913.	Calfskins, country No. 1 (Chicago), relative to 1913.	Sole hemlock middle No. 1 (Boston), relative to 1913.	Chrome calf, B grades (Boston), relative to 1913.	
Monthly average:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1913	100	100	100	100	100
1914	107	111	107	104	102
1915	132	114	110	106	105
1916	142	179	138	167	119
1917	178	215	190	215	153
1918	164	197	172	222	181
1919	214	363	187	300	244
1920	170	195	189	366	288
1920.					
January	218	395	199	473	298
February	219	351	202	473	305
March	198	283	202	473	308
April	197	278	202	464	308
May	192	239	202	436	308
June	185	162	202	399	292
July	160	162	202	325	292
August	155	122	195	325	292
September	154	121	181	297	292
October	139	98	174	278	255
November	126	90	167	232	249
December	103	75	145	213	249
1921.					
January	91	81	142	195	233
February	74	71	135	195	233
March	63	66	131	195	233
April	55	72	131	195	225
May	65	90	131	195	225
June	76	82	128	195	225
July	76	81	124	195	225
August	76	86	121	195	225
September	77	85	121	195	225
October	80	82	121	195	217
November	86	77	121	186	217

[1] As reported in Survey of Current Business, Department of Commerce.
[2] Data from U. S. Department of Labor, Bureau of Labor Statistics.

TABLE 6.—*Wholesale prices of hides, leather, and shoes*[1]—Continued.

Year and month.	Wholesale prices[2] (numerical data).				
	Hides.		Leather.		
	Green salted packer's heavy native steers (Chicago) average price per pound.	Calfskins, country No. 1 (Chicago), average price per pound.	Sole hemlock middle No. 1 (Boston), average price per pound.	Chrome calf, B grades (Boston), average price per square foot.	Boots and shoes, men's vici-calf blucher (Boston), average price per pair.
Monthly average:					
1913	$0.184	$0.189	$0.282	$0.270	$3.11
1914	.196	.210	.302	.280	3.17
1915	.242	.215	.309	.285	3.25
1916	.262	.338	.388	.450	3.71
1917	.327	.406	.535	.579	4.75
1918	.301	.371	.484	.598	5.63
1919	.393	.685	.528	.970	7.60
1920	.312	.368	.534	.985	8.95
1920.					
January	.400	.745	.560	1.275	9.28
February	.403	.663	.570	1.275	9.50
March	.364	.540	.570	1.275	9.60
April	.361	.525	.570	1.250	9.60
May	.354	.450	.570	1.175	9.60
June	.341	.305	.570	1.075	9.10
July	.294	.306	.570	.875	9.10
August	.285	.229	.550	.875	9.10
September	.284	.229	.510	.800	9.10
October	.255	.184	.490	.750	7.94
November	.233	.169	.470	.625	7.75
December	.190	.141	.410	.575	7.75
1921.					
January	.168	.153	.400	.525	7.25
February	.139	.134	.380	.525	7.25
March	.115	.125	.370	.525	7.25
April	.101	.136	.370	.525	7.00
May	.119	.169	.370	.525	7.00
June	.140	.156	.360	.525	7.00
July	.139	.153	.350	.525	7.00
August	.140	.162	.340	.525	7.00
September	.141	.160	.340	.525	7.00

[1] As reported in Survey of Current Business, Department of Commerce.
[2] Data from U. S. Department of Labor, Bureau of Labor Statistics.

Largely because of the attitude of the public beginning about May, 1920, in their refusal to pay constantly mounting prices, and in what is commonly referred to as the "consumer's strike," the retailer through the wholesale merchant began to cancel orders with the shoe manufacturers. This lessened retail demand, caused the shoe manufacturer to slow down, which in turn affected the tanner who refused to buy hides. The problem confronting the retailer, shoe manufacturer, and tanner, then, was the same: To move the goods on hand at a profit, at cost, or as much as could be realized.

The result was to lessen the supply of the partly or completely fabricated product, and through failure to utilize in anything like normal volume to increase the supply of the raw material. This situation has prevailed because of the nature of the live-stock industry in general and the production of hides and skins in particular. Production of the latter continues, despite losses incurred, until the producers' program is completed, which in the case of cattle raising usually extends over a period of two to four years. This is in sharp contrast to manufacturing industries, which, on relatively short

However, whether or not all of an increase in the wholesale price would be finally passed on to the consumer is somewhat difficult to determine. Retail price adjustment usually move by multiples of 25 cents, wholesale prices by multiples of 5 cents. Therefore, whether a change in wholesale prices would affect retail prices largely depends, first, upon the closeness of retail price adjustments, and, second, upon the sharpness of retail competition. Under some conditions for certain grades of shoes a 5-cent increase in the wholesale price might increase the retail price the full 25 cents per pair. Under other conditions an increase in the wholesale price of 15 or 20 cents per pair of shoes might be necessary before the retail trade responded to the increase. In short, while theoretically any increase in the wholesale price of shoes would be passed on to the consumer, in practice it might result that some kinds of shoes would show no increase in price while others would show increases of several times the equivalent duty.

Another possibility resulting from a duty on hides and skins would be the cheapening of the shoe by the use of leather substitutes. Five or ten cents per pair on an $8 pair of shoes is a small item to the consumer, but a saving of 5 cents per pair to the manufacturer may mean a material loss or gain in his manufacturing operations. Any increase in the price of leather will at once affect the amount of leather substitutes which he will put in his product. Well-organized selling campaigns and the manipulation of styles may enable the manufacturer to market a shoe with relatively little leather in it. The use of rubber, of composition soles and insoles, cloth tops, etc., materially decreases the demand for leather, with a consequent effect on the price.

Briefly, then, it may be said with considerable certainty that a duty on hides would be passed on by the manufacturer to the wholesalers and retailers of shoes and other leather products, but whether the retailer will be able to pass on to the consumer the duty or more than the duty largely depends upon the relation of the increased wholesale price, which moves in multiples of 5 cents, to the retail price, which usually is graded in multiples of 25 cents.[20]

THE EFFECT OF AN IMPORT DUTY ON HIDES AND SKINS ON EXPORT TRADE IN LEATHER AND LEATHER PRODUCTS.

The statement is frequently made that if a duty were imposed on hides and skins additional capital would be required to carry the raw material, the cost of manufacture would be increased by the higher price of the material, and our manufacturers would therefore

[20] Regarding the profits of 56 tanning companies for the year 1919, as a result of a careful study, it was stated that "The correlations indicate that the largest profits on investment and on net worth were earned by those tanners whose margins of profit over cost were greatest. This would seem to indicate that the large profits earned in 1919 resulted from large margins of profit taken on each unit of leather sold rather than from an unusually large volume of business done. Of course, many tanners who took only very small margins of profit on each until sold were still able to show substantial returns on investment, which may be explained by the fact that the companies earning the smallest percentage of profit to cost had generally the largest turnovers of invested capital and may be presumed to have had the largest turnovers of stock."

On the profits of 341 shoe manufacturers, this same report stated that "since the largest profits on investment and on net worth were earned by companies whose margins of profit over cost were largest, it would seem that profits in 1919 depended upon 'markups' on each shoe sold rather than upon rapidity of stock turnover. Of course, many companies were able to show a substantial return on investment in spite of small margins of profit taken on each shoe sold; this is explained by the fact that the companies earning the smallest percentages of profit to cost had generally the largest turnovers of invested capital, and may be presumed to have had the largest turnovers of stock." (Federal Trade Commission, Shoe and Leather Costs and Prices, pp. 207, 212.)

be at a disadvantage in competing in foreign markets. In this country both the tanning and leather-manufacturing industries are well organized and are highly developed on the machine basis and, provided they can secure the raw material as easily, can, on some classes of products, compete with any country in either the home or foreign market. There are, on the other hand, some specialties in regard to which American ability to compete is doubtful.

The situation would be relieved to some extent for the leather tanners by customary drawback provisions. The manufacturers of boots and shoes for export and other manufacturers whose product is a highly fabricated article, ready for consumption, would, however, experience difficulty in obtaining the drawback unless their product were made exclusively from imported hides and skins. Furthermore, if domestic hides and skins were increased in price by a duty, American manufacturers who export leather and goods made of such hides and skins would be at a disadvantage, because there would, of course, be no drawback on that material. The only way that such manufacturers could continue their foreign business on the same basis as at present would be to go over to the exclusive use of the imported raw material for their export trade. The effect on the American hide and skin market would then be the same as if such manufacturers were actually operating in a foreign country.

It has often been asserted that the difficulty of collecting the drawback and the fact that not 100 per cent of the duty is refunded make its ostensible benefit greater than its actual advantage. It may be said that those manufacturers—of either leather or leather goods, including boots and shoes—who regularly use imported hides and skins or leather made from such materials, and are organized for the export trade, would probably be in a position to reimburse themselves to a great extent through the medium of the drawback. Those, however, whose export business is only a minor consideration, or those who use a mixture of imported and domestic materials, or those who export only intermittently—perhaps to take advantage of a sudden favorable turn in foreign markets or to avoid unfavorable conditions in the home market—might not find it worth while to collect the drawback but perhaps withdraw from the export trade.

To what extent the American export trade in leather and manufactures of leather would or would not be affected by a duty on hides and skins can not well be predicted. It is impossible to measure accurately the amounts of relative advantage and disadvantage which would accrue to the different branches of production—the cattle raisers, tanners, boot and shoe and other leather goods manufacturers.

During the 10 years from 1898 to 1907, when there was a duty of 15 per cent on cattle hides and when there were compensatory and protective duties on leather and manufactures thereof under the act of 1897,[21] the value of exports of leather and leather manufactures increased rapidly. The total amounted to $21,115,000 in 1898 and to $45,477,000 in 1907, showing an increase of more than 100 per cent. The average for the first five years was $26,080,000 and for the second five years $37,931,000.[22]

[21] Paragraphs 437, 564, and 438, act of 1897.
[22] See Table 12, p. 26.

One of the most important items of export was glazed kid shoe leather made of imported goatskins tanned by the chrome process which was introduced after 1890.

The prices of hides and leather have been increasing, with occasional downward fluctuations, ever since 1890. The tables on pages 26 and 27 show that with the exception of a period of agricultural depression, 1892 to 1896, and the years 1910, 1911, 1920, and 1921, the tendency of hide prices has been upward. Between 1890 and 1913 the average yearly price of green salted packers heavy native steers increased from 9 cents per pound to 18 cents per pound.[23] The prices of leather and leather goods have also been upward during the same period. The average price per pound of hemlock sole leather was 19.2 cents in 1890, 28.2 cents in 1913, and 52.8 cents in 1919. The average price per pound of oak sole leather in 1890 was 37.7 cents per pound; in 1913, 44.9 cents per pound; and in 1919, 91.3 cents per pound.[24] In 1890 the average wholesale price per pair of men's calfskin welt shoes was $2.40; in 1913, $3.113; and in 1919, $7.604.[25] Since 1919 the prices of leather have fallen to about the pre-war level, while the prices of shoes are still above the pre-war level.

REVENUE TO BE DERIVED FROM A DUTY ON HIDES.

A duty on hides and skins would, if imposed, yield a substantial revenue; but owing to the drawback privilege allowed manufacturers when the product made of foreign raw material is exported, the net returns to the Government would be reduced. A duty equivalent to 1 cent per pound on all items, on a green or raw basis, is estimated to yield net between $5,000,000 and $6,000,000 annually. The same rate applied to the directly competitive items only (cattle, calf and kip, sheep and lamb, horse, colt and ass), should yield $3,000,000 to $4,000,000 annually. A like rate of duty on cattle hides, on the basis of 1914 imports, would yield between $2,000,000 and $3,000,000.

TARIFF CONSIDERATIONS.

Except for the period of 1897–1909, hides and skins have been on the free list. Under the act of 1897, hides were duitable at 15 per cent ad valorem.

In case a duty were levied on hides, an ad valorem duty would probably prove most equitable, although compensatory duties to offset increased cost of raw materials would be more difficult to adjust. Under a specific duty, because of the wide range in values of the various classes of hides and skins, low-grade stock would bear a higher rate of duty than high-grade material. However, a specific duty would be especially advantageous to "country" hide producers, in that its ad valorem equivalent on low grades of imported hides and skins, which are directly competitive with country hides and skins, would more definitely tend to restrict such imports.

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[23] U. S. Dept. of Labor, Bu. of Labor Statistics, Bul. on Wholesale Prices, 1890–1919, pp. 34 and 35.
[24] Ibid, pp. 86 and 87.
[25] Ibid, pp. 72 and 73.

The usual conversion equivalent between dried and green hides is about two to one.[26] Dried hides yield about twice as much leather per pound as green. On the basis of value according to invoice figures, imported dried hides have averaged about 50 per cent higher per pound. In case specific duties are desired, per pound levies would be easy to administer and more satisfactory than any other, provided adequate provision was made for the different classes. For instance, the rate per pound should be about 50 per cent higher on dry than on green or pickled hides.

COMPENSATORY DUTIES ON LEATHER AND LEATHER PRODUCTS.

The following illustrative tables, while necessarily tentative and incomplete, have been prepared to suggest the ratio of duty which should exist between raw material and manufactured products in the levy of a compensatory duty on leather and leather products in case a duty should be placed on hides and skins.

In so far as possible these figures have been prepared on the basis of what are believed to be fair prices, which are somewhat higher than pre-war values. According to these figures if a duty, say equivalent to 4 cents per pound, be levied on a green cattle hide, the compensatory duty [27] on a pair of men's shoes made entirely of cattle hides should be about 24 cents; on a pair of men's shoes having soles, welting, etc., made of cattle hides, the compensatory rate should be 16 cents per pair.

It should be said that because of the varying quantities and qualities of hides and skins used for the manufactured product, it is impossible to ascertain exactly what the compensatory duty should be.

In case duties are levied on hides and skins on an ad valorem basis, the compensatory rates may be determined by computing the specific rate per pound on the raw material and applying the computed rate to a table similar to Table 7. In ascertaining the specific rate on the raw material, it will be necessary either to find the actual imported value of the raw material or to make assumptions with reference to such value. For example, if the ad valorem rate were 20 per cent on a 15-cent hide, the specific equivalent would be 3 cents. Then the compensatory rate on men's shoes, made of all dutiable material (from Table 6) would be 18 cents per pair.

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[26] *Yield of leather from dried and green hides:* In general dried hides yield about twice as much leather per pound as green salted hides, and in value dried hides average about 50 per cent more. A dried hide depreciates somewhat in quality and is more difficult to tan.

On the basis of data furnished by one of the largest tanneries, the average pounds of sole leather per 100 pounds of domestic and imported hides, green and dry salted, for the years 1918 and 1919 was as follows (data furnished by Federal Trade Commission):

Domestic:	
Green	73
Dry salted	161
Imported:	
Green	73
Dry salted	160

For upper leather from the same concern the average yields are in square feet of leather per 100 pounds of hides:

Buffs, 45-60 pounds	8
Extremes and buffs	8
Extremes and buffs (country)	8
Kipskins	10
Calfskins	11

[27] Increased value of trimmings and waste neglected, as offsetting increased carrying charges.

TABLE 7.—*Specific compensatory duties on leather and leather products necessary to balance assumed specific duties on green hides.*[1]

Assumed duty on cattle hides (green basis).	Sole leather.	Belting and harness leather.	Upper leather.	Shoes made of cattle hides only.	Shoes having cattle hides in soles, welting, etc., only.
	Factors for conversion.[2]				
	1½	2	1½	6	4
Cents per pound.	*Cents per pound.*	*Cents per pound.*	*Cents per square foot.*	*Cents per pair.*	*Cents per pair.*
1.0	1.5	2	1.25	6	4
1.5	2.25	3	1.88	9	6
2.0	3.0	4	2.50	12	8
2.5	3.75	5	3.13	15	10
3.0	4.50	6	3.75	18	12
3.5	5.25	7	4.38	21	14
4.0	6.0	8	5.0	24	16
4.5	6.75	9	5.63	27	18
5.0	7.50	10	6.25	30	20
5.5	8.25	11	6.88	33	22
6.0	9.0	12	7.50	36	24

[1] Interest charges because of increased cost and duties on tanning materials and oil not included.
[2] The conversion factor here used is figured on the basis of the average amount of hide necessary to produce leather and leather products, i. e., 1½ pounds of hides produce approximately 1 pound of sole leather; 2 pounds of hides produce approximately 1 pound of belting and harness leather, etc.

TABLE 8.—*Ad valorem compensatory duties computed on leather and leather products necessary to balance assumed ad valorem duties on green hides with assumed values for the different products.*[1]

Assumed duty on cattle hides (green basis) valued at $0.15 per pound.	Sole leather.	Belting and harness leather.	Upper leather.	Shoes made of cattle hides only.	Shoes having cattle hides in soles, welting, etc. only.
	Assumed values per unit[2]				
	$0.30 per pound.	$0.30 per pound.	$0.40 per square foot.	$2.50 per pair.	$3.50 per pair.
Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
5	3.75	3.75	3.75	1.8	0.86
7½	5.625	5.625	5.625	2.7	1.29
10	7.500	7.500	7.500	3.6	1.72
12½	9.375	9.375	9.375	4.5	2.15
15	11.250	11.250	11.250	5.4	2.58
17½	13.125	13.125	13.125	6.3	3.01
20	15.000	15.000	15.000	7.2	3.44
25	18.750	18.750	18.750	9.0	4.30
30	22.500	22.500	22.500	10.8	5.16

[1] Interest charges because of increased cost and duties on tanning materials and oils, not included.
[2] Values are assumed to be normal values but are higher than pre-war figures.

For purposes of comparison between specific rates and their ad valorem equivalents, the following is given:

TABLE 9.—*Specific rate equivalent of an ad valorem rate.*

Ad valorem rate.	Hide: Values per pound.					
	15 cents.	16 cents.	17 cents.	18 cents.	19 cents.	20 cents.
Per cent.	*Cents per pound.*	*Cents per pound.*	*Cents per pound.*	*Cents per pound.*	*Cents per pound.*	*Cents per pound.*
5	0.75	0.80	0.85	0.90	0.95	1.00
10	1.50	1.60	1.70	1.80	1.90	2.00
15	2.25	2.40	2.55	2.70	2.85	3.00
20	3.00	3.20	3.40	3.60	3.80	4.00
25	3.75	4.00	4.25	4.50	4.75	5.00
30	4.50	4.80	5.10	5.40	5.70	6.00

The following table gives the ad valorem equivalents of specific rates, with hide values ranging from 15 cents to 20 cents per pound, i. e., a specific rate of 3 cents per pound is equivalent to an ad valorem rate of 20 per cent on 15-cent hides and 15 per cent on 20-cent hides.

TABLE 10.—*Ad valorem equivalent of a specific rate.*

Specific duty per pound.	Hide values per pound.					
	15 cents.	16 cents.	17 cents.	18 cents.	19 cents.	20 cents.
Cents.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	6.67	6.25	5.88	5.55	5.26	5.0
2	13.33	12.50	11.76	11.10	10.52	10.0
3	20.00	18.75	17.64	16.65	15.78	15.0
4	26.66	25.00	23.52	22.20	21.04	20.0
5	33.33	31.25	29.40	27.75	26.30	25.0
6	40.00	37.50	35.28	33.30	31.56	30.0

TABLE 11.—*Hides and skins—Imports for consumption, 1911–1921.*

FISCAL YEAR 1911.

	Dry.		Green.		Total dry and green.	Converted to a green basis.	Total value.
	Quantity.	Value.	Quantity.	Value.			
	Pounds.		*Pounds.*		*Pounds.*	*Pounds.*[1]	
Cattle hides	55,415,612	$10,214,913	95,105,021	$11,453,135	150,521,633	205,937,245	$21,668,048
Calfskins	23,409,138	7,762,033	36,324,795	6,429,504	59,733,933	83,143,071	14,191,537
Sheep and lamb skins	18,814,831	3,613,752	36,677,265	5,400,763	55,492,096	74,306,927	9,014,515
Horse, colt, and ass.	4,539,921	1,010,154	5,717,426	572,838	10,257,347	14,797,268	1,582,992
Buffalo skins	3,347,390	502,507	18,432	1,839	3,365,822	6,713,212	504,346
Goatskins	64,331,441	18,790,711	21,575,159	2,964,064	85,906,600	150,238,041	21,754,775
Kangaroo and wallaby	708,400	436,007			1,708,400	1,416,800	436,007
All other, except furs	7,471,486	1,354,513			7,471,486	14,942,972	1,354,513
Total	178,038,219	43,684,590	195,419,098	26,822,143	373,457,317	551,495,536	70,506,733

FISCAL YEAR 1912.

Cattle hides	77,432,776	$15,084,398	173,863,832	$23,316,115	251,296,608	328,729,384	$38,400,513
Calfskins	42,252,928	14,743,576	72,902,345	11,766,138	115,155,273	157,408,201	26,509,714
Sheep and lamb skins	25,860,502	5,013,055	34,613,049	4,843,149	60,473,551	86,334,053	9,856,204
Horse, colt, and ass.	7,265,142	1,483,276	5,496,223	563,282	12,761,365	20,026,507	2,046,558
Buffalo skins	4,919,945	740,501	82,313	8,789	5,002,258	9,922,203	749,290
Goatskins	69,128,899	19,980,165	26,141,090	3,359,057	95,269,989	164,398,888	23,339,222
Kangaroo and wallaby	871,616	448,759			871,616	1,743,232	448,759
All other, except furs	5,832,718	1,021,325			5,832,718	11,665,436	1,021,325
Total	233,564,526	58,515,055	313,098,852	43,856,530	546,663,378	780,227,904	102,371,585

[1] *One pound of dry equal to 2 pounds of green.*

TABLE 11.—*Hides and skins—Imports for consumption, 1911–1921*—Continued.

FISCAL YEAR 1913.

	Dry.		Green.		Total dry and green.	Converted to a green basis.	Total value.
	Quantity.	Value.	Quantity.	Value.			
	Pounds.		*Pounds.*		*Pounds.*	*Pounds.*	
Cattle hides	82,419,649	$18,654,376	196,241,539	$27,662,744	278,661,188	361,080,837	$46,317,120
Calfskins	40,406,670	15,203,529	53,935,020	11,088,168	94,341,690	134,748,360	26,291,697
Sheep and lambskins	30,917,905	6,396,267	40,669,270	5,967,504	71,587,175	102,505,080	12,363,771
Horse, colt, and ass	10,514,666	2,129,083	8,554,153	953,764	19,068,819	29,583,485	3,082,847
Buffalo skins	16,323,854	2,802,937	54,505	4,409	16,378,359	32,702,213	2,807,406
Goatskins	73,166,489	21,110,205	25,401,857	3,627,442	98,568,346	171,734,835	24,737,647
Kangaroo and wallaby	1,097,038	719,188			1,097,038	2,194,076	719,188
All other, except furs	4,926,737	955,331			4,926,737	9,853,474	955,331
Total	259,773,008	67,970,976	324,856,344	49,304,031	584,629,352	844,402,360	117,275,007

FISCAL YEAR 1914.

Cattle hides	71,197,161	$18,041,521	308,837,663	$34,123,276	380,034,824	351,231,985	$52,164,797
Calfskins	28,003,588	11,633,613	54,126,753	11,745,592	82,130,341	110,133,929	23,379,205
Sheep and lambskins	31,028,747	6,411,713	39,007,285	6,199,559	70,036,032	101,064,779	12,611,272
Horse, colt, and ass	7,791,044	1,650,070	4,475,578	507,398	12,266,622	20,057,666	2,157,468
Buffalo skins	14,465,550	3,099,221	230,516	24,531	14,696,066	29,161,616	3,093,752
Goatskins	63,315,852	19,057,795	21,293,248	3,128,817	84,609,100	147,924,952	22,186,612
Kangaroo and wallaby	1,331,568	898,087			1,331,568	2,663,136	898,087
All other, except furs	6,185,703	1,148,711			6,185,703	12,371,406	1,148,711
Total	223,319,213	61,910,731	327,971,043	55,729,173	551,290,256	774,609,469	117,639,904

FISCAL YEAR 1915.

Cattle hides	93,597,171	$21,448,083	240,317,817	$39,579,719	333,914,988	427,512,159	$61,027,802
Calfskins	15,746,654	4,192,667	31,147,253	6,672,277	46,893,907	62,640,561	10,864,944
Sheep and lambskins	21,010,807	3,983,323	37,812,573	6,017,930	58,823,380	79,834,187	10,001,253
Horse, colt, and ass	5,431,165	1,253,306	3,774,609	399,495	9,205,774	14,636,939	1,652,801
Buffalo skins	12,422,743	2,325,243	517,325	53,090	12,940,068	25,362,811	2,378,333
Goatskins	50,812,613	13,925,615	15,729,852	2,255,500	66,542,465	117,355,078	16,181,115
Kangaroo and wallaby	769,125	427,127			769,125	1,538,250	427,127
All other, except furs	9,720,113	1,654,812			9,720,113	19,440,226	1,654,812
Total	209,510,391	49,210,176	329,299,429	54,978,011	538,809,820	748,320,211	104,188,187

FISCAL YEAR 1916.

Cattle hides	153,100,016	$37,399,510	281,615,918	$50,694,454	434,715,934	587,815,950	$88,093,964
Calfskins	26,825,444	7,313,836	37,182,921	9,039,028	64,008,365	90,833,809	16,852,864
Sheep and lambskins	54,766,943	11,385,027	46,583,371	7,463,170	101,350,314	156,117,257	18,848,197
Horse, colt, and ass	6,597,292	1,227,145	11,494,335	1,088,658	18,091,627	24,688,919	2,315,803
Buffalo skins	13,138,535	2,489,645	1,041,296	126,237	14,179,831	27,318,366	2,615,882
Goatskins	84,600,242	25,190,460	15,122,192	2,208,536	99,722,434	184,322,676	27,398,996
Kangaroo and wallaby	1,192,632	707,663			1,192,632	2,385,264	707,663
All other, except furs	9,829,294	2,004,743			9,829,294	19,658,588	2,004,743
Total	350,050,398	88,218,029	393,040,033	70,620,083	743,090,431	1,093,140,829	158,838,112

FISCAL YEAR 1917.

Cattle hides	171,490,891	$48,769,802	224,770,135	$51,279,610	396,261,026	567,751,917	$100,049,412
Calfskins	34,664,217	11,010,941	12,406,899	4,534,869	47,071,116	81,735,333	15,545,810
Sheep and lambskins	55,478,458	17,948,002	40,457,403	11,630,521	95,935,861	151,414,319	29,578,523
Horse, colt, and ass	12,180,755	3,731,439	15,498,220	2,461,303	27,678,975	39,859,730	6,192,742
Buffalo skins	27,095,228	6,124,789	218,528	32,105	27,313,756	54,408,984	6,156,894
Goatskins	92,362,738	51,892,209	13,214,752	3,642,399	105,577,490	197,940,228	55,444,608
Kangaroo and wallaby	958,629	721,754			958,629	1,917,258	721,754
All other, except furs	10,004,698	2,784,538			10,004,698	20,009,396	2,784,538
Total	404,235,614	142,893,474	306,565,937	73,580,807	710,801,551	1,115,037,165	216,474,281

TABLE 11.—*Hides and skins—Imports for consumption, 1911–1921*—Continued.

FISCAL YEAR 1918.

	Dry.		Green.		Total dry and green.	Converted to a green basis.	Total value.
	Quantity.	Value.	Quantity.	Value.			
	Pounds.		*Pounds.*		*Pounds.*	*Pounds.*	
Cattle hides	80,036,808	$24,626,852	187,177,896	$43,095,152	267,214,704	347,251,512	$67,722,004
Calfskins	8,785,186	3,652,790	4,170,862	1,555,086	12,956,048	21,741,234	5,207,876
Sheep and lamb skins	32,305,867	11,814,409	23,716,762	7,421,582	56,022,629	88,328,496	19,235,991
Horse, colt, and ass.	2,654,507	625,200	6,305,379	882,460	8,959,886	11,614,393	1,507,660
Buffalo skins	10,579,007	2,799,211	1,437,953	374,682	12,016,960	22,595,967	3,173,893
Goatskins	56,840,030	29,799,082	10,277,584	2,014,821	67,117,614	123,957,644	31,813,903
Kangaroo and wallaby	634,975	694,016			634,975	1,269,950	694,016
All other, except furs	7,174,213	2,075,837			7,174,213	14,348,426	2,075,837
Total	199,010,593	76,087,397	233,086,436	55,343,783	432,097,029	631,107,622	131,431,180

CALENDAR YEAR 1918.

Cattle hides	35,155,106	$10,254,045	185,432,280	$41,708,075	220,587,386	255,742,492	$51,962,120
Calfskins	5,383,279	2,175,470	2,093,402	717,367	7,476,681	12,859,960	2,892,837
Sheep and lamb skins	21,549,713	7,517,651	31,422,331	10,047,914	52,972,044	74,521,757	17,565,565
Horse, colt, and ass.	868,742	183,003	4,128,814	536,682	4,997,556	5,866,298	719,685
Cabretta							
Buffalo skins	5,779,483	1,537,182	1,393,463	380,961	7,172,946	12,952,429	1,918,143
Goatskins	53,458,173	28,626,610	9,057,918	1,865,306	62,516,091	115,974,264	30,491,915
Kangaroo and wallaby	645,988	719,093			645,988	1,291,976	719,093
All other, except furs	4,863,707	1,553,298			4,863,707	9,727,414	1,553,298
Total	127,704,191	52,566,352	233,528,208	55,256,305	361,232,399	488,936,590	107,822,657

CALENDAR YEAR 1919.

Cattle hides	96,175,601	$34,360,222	310,965,319	$91,223,542	407,140,920	503,316,521	$125,583,764
Calfskins	42,325,180	20,914,313	22,230,341	12,738,819	64,555,521	106,880,701	33,653,132
Sheep and lamb skins	43,560,327	21,288,088	41,471,500	15,232,461	85,031,827	128,592,154	36,520,549
Horse, colt, and ass.	15,973,796	3,633,399	12,077,113	3,612,468	28,050,909	44,024,705	7,245,867
Cabretta	93,985	86,382			93,985	187,970	86,382
Buffalo skins	15,619,738	3,463,457	1,892,149	511,966	17,511,887	33,131,625	3,975,423
Goatskins	111,133,387	85,827,011	22,522,563	9,729,448	133,655,950	244,789,337	95,556,459
Kangaroo and wallaby	1,383,939	1,362,991			1,383,939	2,767,878	1,362,991
All other, except furs	7,264,890	2,517,525			7,264,890	14,529,780	2,517,525
Total	333,530,843	173,453,388	411,158,985	133,048,704	744,689,828	1,078,220,671	306,502,092

CALENDAR YEAR 1920.

Cattle hides	59,150,408	$21,092,121	216,174,099	$64,383,203	275,324,507	334,474,915	$85,475,324
Calfskins	16,902,653	9,979,730	18,229,633	9,270,931	35,132,286	52,034,939	19,250,661
Sheep and lamb skins	29,832,904	17,395,159	52,857,541	20,800,980	82,690,445	112,523,349	38,196,139
Horse, colt, and ass.	5,043,439	1,619,774	11,802,968	2,635,555	16,846,407	21,889,846	4,255,329
Cabretta	12,377	14,285			12,377	24,754	14,285
Buffalo skins	9,483,786	2,721,204	1,759,648	502,186	11,243,434	20,727,220	3,223,390
Goatskins	69,869,332	84,410,287	10,335,304	6,229,955	80,204,636	150,073,968	90,640,242
Kangaroo and wallaby	1,388,732	1,480,712			1,388,732	2,777,464	1,480,712
All other, except furs	7,313,721	3,233,328			7,313,721	14,627,442	3,233,328
Total	198,997,352	141,946,600	311,159,193	103,822,810	510,156,545	709,153,897	245,769,410

CALENDAR YEAR 1921.

Cattle hides	13,257,154	$2,349,104	166,929,295	$20,910,248	180,186,449	193,443,603	$23,259,352
Calfskins	14,263,427	3,272,580	33,676,651	7,091,635	47,940,078	62,203,505	10,364,215
Sheep and lamb skins	13,452,473	3,327,482	32,397,177	4,686,324	45,849,650	59,302,123	8,013,806
Horse, colt, and ass.	811,602	96,677	3,247,873	269,596	4,059,475	4,871,077	366,273
Cabretta	23,323	10,678			23,323	46,646	10,678
Buffalo skins	1,918,050	358,481	223,558	44,918	2,141,608	4,059,658	403,399
Goatskins	54,924,642	22,373,876	8,201,585	1,497,338	63,126,227	118,050,869	23,871,214
Kangaroo and wallaby	455,246	283,370			455,246	910,492	283,370
All other, except furs	4,263,026	989,604			4,263,026	8,526,052	989,604
Total	103,368,943	33,061,852	244,676,139	34,500,059	348,045,082	451,414,025	67,561,911

E 12.—*Value of leather and leather products exported from the United States, 1890–1922.*

scal year.	Exports.	Fiscal year.	Exports.	Fiscal year.	Exports.
	$12,439,000	1903	$31,616,000	1915	$120,727,000
	13,279,000	1904	33,980,000	1916	146,704,000
	12,085,000			1917	153,710,000
	11,912,000	5-year average.	30,122,000	1918	100,881,000
	14,283,000			1919	182,964,000
5-year average.	12,800,000	1905	37,937,000		
		1906	40,645,000	5-year average.	140,997,000
	15,614,000	1907	45,477,000		
	20,243,000	1908	40,739,000	1920	291,801,000
	19,161,000	1909	42,976,000	1921	98,208,000
	21,115,000				
	23,468,000	5-year average.	41,555,000	2-year average.	195,004,000
5-year average.	19,920,000				
		1910	52,647,000	July, 1921, to April, 1922 (10 months)	47,340,000
	27,293,000	1911	53,673,000		
	27,924,000	1912	60,757,000		
	29,799,000	1913	63,893,000		
		1914	57,566,000		
		5-year average.	57,707,000		

TABLE 13.—*Average prices of packer hides, 1895 to 1911.*

ar.	Heavy native steers.	Butt-branded steers.	Heavy Texas steers.	Light Texas steers.	Heavy Colorado steers.	Heavy native cows.	Light native cows.	Branded cows.	Native bulls.	Branded bulls.
	$14.81	$13.50	$14.32	$13.54	$13.47	$13.87	$13.50	$12.56	$12.11	$10.50
	15.29	13.71	14.88	13.77	13.42	13.79	13.04	12.40	11.96	11.10
	16.47	15.49	16.41	15.35	15.29	15.21	14.83	14.11	13.10	12.04
	13.36	12.28	13.86	12.46	12.21	11.43	11.04	10.43	10.03	8.73
	14.55	12.99	13.96	13.26	12.70	13.10	11.71	11.98	12.13	10.08
	15.43	13.99	14.89	14.84	13.65	14.96	14.84	14.27	12.21	10.56
	14.30	13.21	14.44	13.91	13.08	13.16	13.10	12.74	10.77	9.76
	11.66	10.89	12.65	11.67	10.81	10.60	10.52	10.28	9.10	8.15
	11.69	10.57	12.64	11.19	10.54	10.07	9.64	9.19	9.61	7.69
	13.38	12.33	14.41	12.42	12.10	11.12	10.12	10.01	10.50	9.10
	12.37	11.46	12.88	11.53	11.21	10.66	10.07	9.87	10.19	8.54
	11.94	11.04	11.99	11.09	10.49	10.62	10.44	10.18	9.93	8.42
	12.34	11.44	12.07	11.55	10.70	11.27	10.40	10.90	10.04	8.50
	11.50	10.08	10.74	10.43	9.24	10.84	11.02	9.72	9.56	7.32
	9.96	9.14	9.33	8.94	8.28	9.35	9.74	8.74	8.27	6.36
	8.14	7.25	7.44	6.94	6.45	7.51	7.53	6.66	6.63	5.25
	10.20	8.97	9.48	8.60	8.39	8.76	8.52	8.00	7.41	6.42

TABLE 14.—*Average prices of country hides, 1895 to 1911.*

ar.	No. 1 heavy steers.	Country packers, branded flat.	No. 1 heavy cows.	Country, branded flat.	No. 1 buffs.	No. 1 extremes.	No. 2 buffs.	Bulls flat.	No. 1 calf-skins.	No. 1 kips.
	$12.24	$10.72	$11.82	$10.02	$11.82	$12.80	$10.79	$10.01	$16.34	$13.23
	12.16	10.20	11.26	9.49	11.13	11.51	10.02	9.86	16.02	12.03
	14.17	12.55	13.40	11.44	13.24	13.55	12.21	11.13	17.92	14.11
	10.61	8.90	9.35	8.04	9.29	9.75	8.21	7.86	14.17	10.09
	12.05	10.69	11.02	9.66	10.79	10.99	9.64	10.02	14.90	11.60
	13.83	12.48	13.49	12.51	13.43	13.43	12.47	11.29	15.54	14.05
	12.47	11.86	11.92	10.93	11.88	12.14	10.96	9.39	14.84	12.58
	10.03	9.42	9.47	8.42	9.45	9.75	8.49	7.87	13.37	11.08
	9.71	8.82	8.66	7.85	8.59	8.87	7.63	7.75	12.05	10.16
	10.99	9.45	9.41	8.55	8.74	8.83	7.78	8.73	11.89	9.67
	10.50	8.84	9.25	8.56	8.73	8.77	7.73	8.43	11.93	9.36
	10.29	8.75	9.30	8.73	9.11	9.52	8.26	8.05	11.91	10.16
	10.79	9.69	10.13	9.56	10.08	10.43	9.58	8.71	12.84	10.95
	10.25	8.85	9.90	8.85	9.94	10.49	9.43	8.46	12.49	11.20
	9.00	7.77	8.65	7.88	8.86	9.55	8.35	7.45	12.08	10.50
	7.20	6.16	6.86	6.21	6.85	7.43	6.36	5.83	9.10	7.96
	8.79	8.07	7.97	7.26	7.86	8.07	7.36	6.51	11.23	8.93

UNITED STATES TARIFF COMMISSION
WASHINGTON

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THE EMERGENCY TARIFF

And Its Effect on Cattle and Beef, Sheep and Mutton, Wool, Pork, and Miscellaneous Meats

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FOREWORD.

This report presents a general view of the effect of the emergency tariff act on domestic production of meats and wool. Normal production and import and export figures are contrasted with the trade movement in 1921 to bring out more clearly the effects of the act.

In the preparation of this report the Tariff Commission had the services of Dr. L. G. Connor, of the commission's staff, and of others.

THE EMERGENCY TARIFF AND ITS EFFECT ON CATTLE AND BEEF, SHEEP AND MUTTON, WOOL, PORK, AND MISCELLANEOUS MEATS.

CATTLE.

The tariff act of 1909 placed a duty of $2 per head on cattle less than 1 year old, $3.75 per head on other cattle valued at $14 per head or less, and 27½ per cent ad valorem on other cattle valued at more than $14 per head. The duty on fresh beef and veal was 1½ cents per pound. Under the tariff act of 1913 all the foregoing were placed on the free list. The emergency tariff of May 28, 1921, levied a dtuy of 30 per cent ad valorem on cattle and 2 cents per pound on fresh beef and veal.

Until 1907 the United States virtually dominated the world's export trade in beef, and also exported large numbers of live cattle, mainly heavy, well finished animals for the British trade. The annual exports of fresh beef, and of live cattle, reduced to their equivalent in beef, averaged nearly 700,000,000 pounds per year from 1900 to 1907, inclusive, or approximately 10 per cent of domestic slaughterings. Practically one-third of the exports consisted of fat cattle, which averaged nearly 478,000 head per year. During this same period the United States imported each year some live cattle, and a small amount of fresh, cured, and other beef. The cattle were almost all thin Mexican animals of stocker type, brought in to fatten on grass; an annual average of about 74,000 head was imported from 1900 to 1907, inclusive, or approximately one-sixth as many as were exported. The total imports of beef and of beef in the form of live cattle averaged less than 30,000,000 pounds per year, or less than 5 per cent of the amount exported. Beef imported in the form of live animals amounted to 90 per cent of the total imports.

In the seven years following 1907 the total domestic production of beef and veal declined from 7,946,000,000 pounds to 6,072,000,000 pounds, exports of beef and of cattle rapidly declined, and a small import balance—108,770,000 pounds appeared in 1913. In 1914 this mport balance amounted to 461,271,000 and in 1915 to 147,205,000 pounds.[1] During this period imports of live cattle steadily increased, especially after the revolution began in Mexico, when operators in ahat country sent large numbers to the United States in order to cvoid confiscation. Imports of live cattle from Canada also intreased, particularly after the tariff of 1913 became effective. The total number imported increased from 92,000 in 1908 to 872,000 in 1914, fell to 539,000 in 1915, and averaged nearly 346,000 head from 1908 to 1915, inclusive. For 1913 to 1915, inclusive, the number averaged 612,000 a year.[2] The average beef equivalent of these cattle—243,000,000 pounds per year for 1913 to 1915, inclusive,

[1] See report of the U. S. Tariff Commission, The Cattle and Beef Industry, 1922.
[2] See Table 3, p. 9.

accounted for the average net import balance of 239,000,000 pounds of beef and veal during these three years.

Thus, in the space of six years following 1907, the United States changed from a heavy export to a small import basis. This change resulted from competition between cattle and crops in humid regions, between cattle and homesteaders in subhumid regions, and from drought and feed shortage during a few years ending in 1914. However, the heavy war-time demand was developing in 1915; the scarcity of shipping placed a premium on American beef, and the high prices that followed had an almost immediate stimulating effect on domestic production.

As a result, the number of cattle, and the production of beef, increased rapidly after 1914. Then, too, continued imports from Mexico and Canada, chiefly of stocker and feeder cattle brought in for fattening, were a factor of some, though small, importance in the increased production of beef and veal. Total imports of live cattle averaged 426,000 head per fiscal year from 1916 to 1920, inclusive. The total number slaughtered, exclusive of calves, had fallen from 13,469,900 in 1907 to 10,822,100 in 1915. It then rose to 15,750,400 in 1918. For 1916 to 1920, inclusive, the number of cattle slaughtered, other than calves, averaged 13,462,500 head per year. The number of calves slaughtered fell from 6,026,800 in 1907 to 4,639,500 in 1915, but advanced to 9,662,800 in 1920 when war-time increases were being rapidly liquidated. The production of beef and veal followed the increase in slaughterings. From a total of 6,072,000,000 pounds in 1914, it increased to 8,367,000,000 pounds in 1918, or larger than ever before. The small balance of 1913 to 1915, inclusive, was changed to a considerable surplus of exports during the following four years. For the time being the tariff problem, which came to the front in 1913, was forgotten.

The tariff problem again asserted itself in 1920. In a partial liquidation of war-time increases, heavy marketings of domestic cattle occurred in that year. Heavy imports of Canadian cattle, also a partial liquidation of war increases, passed through the markets of the United States in 1920. Furthermore, alleviation of the shipping shortage made available large supplies of cheaper Australasian meats, while sharply depreciated foreign exchange militated against the more desirable but more costly American meats. Thus there was a large increase in the available supply. But owing to growing industrial stagnation at home and abroad, the demand decreased considerably in the latter part of 1920, and prices declined rapidly. Since the shipping scarcity had placed a premium on American beef, which could be landed in Europe in one-fourth the time necessary to ship from Argentina and one-sixth the time necessary to move beef from Australasia, American prices had risen out of line with these exporting countries. American prices, therefore, felt the effect of unrestricted world supplies some months before deflation set in in the Southern Hemisphere. Thus the seasonal decline in the fall of 1920 became a permanent decline throughout the winter of 1921, whereas prices in Argentina did not show much change until May, 1921.

This decline in domestic price had a serious effect on the domestic producer, particularly in the range country. A three-year drought

in the Southwest had ended in 1918; in order to restock, the stockmen had invested heavily during the period of peak prices. In 1919 a severe drought on the northern ranges, followed by one of the most expensive winters on record, had forced the cattlemen to assume heavy financial obligations in order to save their herds. In the farming region the cattle feeders had made their 1920 beef with high-priced 1919 feed, much of it purchased from farmers who did not make a practice of fattening live stock. The erratic and declining market of 1920 came at a time when the stockmen and feeders could ill afford it. Largely because of receipts of Canadian cattle on the American markets, 316,559 head out of a total importation of 379,114 cattle in the calendar year 1920, foreign competition was popularly fastened upon as the prime factor in the price decline, and an emergency tariff was demanded in the early winter of that year in order, if possible, to alleviate conditions.

During 1921 the financial stringency and industrial stagnation of the latter part of 1920 continued. Forced liquidation of live stock, a distressing phenomenon of the latter part of 1920, when live-stock markets often were so seriously congested that the animals sometimes had to be penned in the "alleys" without feed or water for days at a time, was also repeated, though to a less extent; meanwhile depressed domestic demand forced prices downward still further. At the same time, financial stringency and earlier losses resulted in a serious curtailment of demand for feeder cattle. For the first five months of 1921 native beef steers at Chicago averaged only $8.50 per 100 pounds, as against $12.95 during the same period in 1920, and $15.75 in 1919. The condition of the beef producer, therefore, seemed critical in 1921. By early summer the producers foresaw a real danger to the future of American herds if domestic prices fell much further. Furthermore, at the time of the passage of the emergency tariff the chief importing market—Great Britain—was glutted with imported meats. Large supplies were reaching Europe from the principal exporting countries, particularly from Australasia and Argentina. Although it was due to imports of live cattle from Canada that the United States was in a position of unstable equilibrium between a surplus of imports and a surplus of exports in 1920 and 1921, in the long run it was Australasia and Argentina that the domestic producers especially feared; beef is produced in those countries on a year-long grazing basis and at a much lower cost than in the United States.

The emergency tariff became effective on May 28, 1921. Thereafter the decline in price of choice to prime beef steers ceased in the United States until the close of the grazing season, when a seasonal decline always occurs.[3] However, because of a slack demand for other qualities, and despite smaller market receipts, the price of animals below top grade fell somewhat after June 1. It is significant, however, that in Canada prices fell much more than in the United States. Canada has furnished the bulk of the live cattle imported during recent years, and, until Mexican herds are reestablished, is the only country from which the United States can expect to receive appreciable numbers of butcher animals. Owing to larger per capita supplies, after June 1 Canada had to remain on an export basis.

[3] Choice to prime beef steers on the Chicago market averaged $9.86 per 100 pounds from Jan. 1 to May 31, and $9.95 from June 1 to Nov. 30, 1921.

Therefore, if the emergency tariff operated to hold the domestic market above the world level, its effects should show in an increased differential between Canadian and American markets. Since Canada was on an export basis, her prices logically would follow the world level, which was steadily declining during the summer of 1921. The following tabulation shows the average price, by grades and for all qualities within each grade, for the Chicago, Toronto, and Winnipeg markets during the five months ended May 31 and the six months ended November 30, 1921, Canadian prices converted at current exchange. Sheep, lamb, and hog prices are included for their general interest and for convenient reference.

TABLE 1.—*Monthly average prices of live cattle, sheep, and hogs, 1921.*

[Per 100 pounds.]

CHICAGO.

Month.	Native beef cattle.			Fat cows and heifers.	Cutters and canners.	Stockers and feeders.	Sheep.	Lambs.	Hogs and pigs.
	Light, 750 to 1,050.	Medium, 1,050 to 1,200.	Medium to heavy, 1,200 to 1,400.						
January	$7.90	$8.60	$9.67	$6.20	$3.70	$7.20	$4.95	$10.90	$9.55
February	7.50	8.10	8.93	5.85	3.25	6.80	4.75	9.20	9.50
March	8.40	9.10	9.83	6.65	3.65	8.10	5.80	9.65	10.20
April	7.65	7.95	8.50	6.25	3.00	7.40	6.45	9.60	8.53
May	7.75	7.90	8.47	6.05	3.10	7.35	6.25	11.10	8.22
Average	7.84	8.33	9.08	6.20	3.34	7.37	5.64	10.09	9.20
June	7.55	7.75	8.15	5.05	2.20	6.10	4.60	11.00	8.05
July	7.40	7.65	8.28	5.40	2.75	6.10	5.40	10.30	9.92
August	6.90	7.50	9.08	5.10	2.50	5.90	4.75	9.65	9.37
September	6.90	7.30	8.22	4.60	2.75	5.50	4.10	8.80	7.50
October	6.75	7.35	8.48	4.80	2.95	5.65	4.70	8.55	7.82
November	5.90	6.50	7.72	4.80	2.55	5.45	4.15	8.95	7.32
Average	6.90	7.34	8.32	4.96	2.62	5.78	4.62	9.34	8.33

WINNIPEG.

Month.	Steers.			Cows and heifers.	Cutters and canners.	Stockers and feeders.	Sheep.	Lambs.	Hogs.
	Heavy finished.	Medium weight.	Light weight.						
January	$6.59	$5.66	$5.26	$4.97	$2.81	$4.83	$4.80	$8.04	$9.89
February	6.76	6.76	5.29	4.97	2.61	4.62	5.35	8.40	10.10
March	7.19	6.35	5.85	5.16	2.78	5.34	5.32	8.32	10.19
April	6.88	6.38	5.91	5.14	2.31	5.00	5.78	7.31	10.07
May	6.60	6.44	6.17	5.35	2.51	5.07	5.61	9.12	8.90
Average	6.80	6.32	5.70	5.12	2.60	4.97	5.37	8.24	9.83
June	5.87	5.30	5.06	4.35	1.57	3.66	4.82	7.70	8.07
July	5.04	4.19	3.98	3.76	1.13	2.71	4.03	7.85	9.36
August	4.65	3.66	3.51	3.37	1.18	2.79	4.23	6.89	10.64
September	4.22	3.60	3.34	2.86	1.35	2.84	3.49	6.38	9.05
October	3.92	3.46	3.21	2.81	1.34	2.84	3.19	6.10	8.16
November	3.83	3.49	3.28	2.88	1.53	2.86	3.09	6.19	7.19
Average	4.59	3.95	3.73	3.34	1.35	2.95	3.81	6.85	8.74

TABLE 1.—*Monthly average price of live cattle, sheep, and hogs, 1921*—Continued.

TORONTO.

Month.	Steers.			Cows and heifers.	Cutters and canners.	Stockers and feeders.	Sheep.	Lambs.	Hogs.
	Heavy finished.	Medium weight.	Light weight.						
January	$8.59	$7.52	$5.74	$5.32	$3.29	.....	$4.83	$8.81	$11.94
February	8.25	7.23	6.35	5.74	3.13	.....	5.16	8.84	11.28
March	9.06	7.85	7.26	6.49	2.96	.....	5.98	9.82	11.73
April	8.83	7.82	7.28	6.62	2.73	.....	6.79	10.38	9.80
May	8.46	7.60	7.30	6.57	2.64	.....	6.15	10.87	7.75
Average	8.64	7.60	6.99	6.35	2.95	.....	5.78	9.74	10.50
June	7.27	6.60	6.34	5.59	1.59	.....	4.23	10.89	8.74
July	6.55	5.44	5.39	4.52	1.63	.....	3.19	8.73	9.16
August	6.81	5.78	4.91	4.28	1.50	.....	2.97	7.09	10.18
September	6.64	5.47	4.83	4.16	1.74	.....	2.43	6.46	7.50
October	5.98	4.96	4.27	3.83	1.94	.....	2.95	6.59	6.99
November	5.84	4.65	4.14	3.83	1.87	.....	2.78	6.96	6.65
Average	6.51	5.48	4.98	4.37	1.71	.....	3.09	7.79	8.20

Table 1 shows a pronounced widening in the differential between Chicago and Canadian prices after June in every class of live stock except hogs. In three instances—fat cows and heifers, sheep, and hogs—Toronto prices were higher than Chicago prior to June 1, but during the next six months the first two fell far below the Chicago level. Although the difference was narrowed considerably, hogs, of which there appears to have been a shortage, remained higher at Toronto than at Chicago. Winnipeg prices were higher than Chicago prior to June 1 only in the case of hogs, which as yet are not extensively produced in western Canada. After June 1, owing to the longer rail haul to Toronto, the differential between cattle prices at Winnipeg and Chicago widened even more than between Chicago and Toronto.

Table 2 brings out more clearly the increased differential between Chicago and the Canadian markets after June 1. It will be seen that during the six months after June 1 light to heavy beef steers averaged 76 to 99 cents, with a mean of 90 cents per hundred pounds less at Chicago than during the previous five months, but averaged from $2.01 to $2.13, with a mean of $2.09 less at Toronto. Since the differential in favor of Chicago averaged only 67 cents per hundred pounds prior to June 1, the greater decline in prices at Toronto widened the differentials to $1.19 per hundred pounds. At Winnipeg it widened to $1.29 per hundred.

TABLE 2.—*Comparison of Chicago and Canadian prices of live stock, 1921.*

[Average price per 100 pounds.]

	Steers.			Fat cows and heifers.	Cutters and canners.	Stockers and feeders.	Sheep.	Lambs.	H
	Light.	Medium.	Heavy.						
Chicago:									
Jan. 1 to May 31	$7.84	$8.33	$9.08	$6.20	$3.34	$7.37	$5.84	$10.09	
June 1 to Nov. 30	6.90	7.34	8.32	4.96	2.62	5.78	4.62	9.54	
Difference	.94	.99	.76	1.24	.72	1.59	1.02	.55	
Toronto:									
Jan. 1 to May 31	6.99	7.60	8.64	6.35	2.95	.....	5.78	9.74	
June 1 to Nov. 30	4.98	5.48	6.51	4.37	1.71	.....	3.09	7.79	
Difference	2.01	2.12	2.13	1.98	1.24	.....	2.69	1.95	
Winnipeg:									
Jan. 1 to May 31	5.70	6.32	6.80	5.12	2.60	4.97	5.37	8.24	
June 1 to Nov. 30	3.73	3.95	4.59	3.34	1.35	2.95	3.81	6.85	
Difference	1.97	2.37	2.21	1.78	1.25	2.02	1.56	1.39	
Difference between Chicago and Toronto:									
Jan. 1 to May 31	.85	.73	.44	−.15	.39	.....	−.14	.35	−1
June 1 to Nov. 30	1.92	1.86	1.81	.59	.91	.....	1.53	1.75	
Increase	1.07	1.13	1.37	.44	.52	.....	1.39	1.40	−1
Difference between Chicago and Winnipeg:									
Jan. 1 to May 31	2.14	2.01	2.28	1.08	.74	2.40	.27	1.85	−
June 1 to Nov. 30	3.17	3.39	3.73	1.62	1.27	2.83	.81	2.69	−
Increase	1.03	1.38	1.45	.54	.53	.43	.54	.84	−

The widening of the differential between Chicago and Canadi markets greatly affected imports of cattle from Canada. Un near the end of the grazing season of 1921, prices in Canada did n fall enough to permit the importation of large numbers of cattle; b soon after September 1 Canadian prices dropped to new low leve At the same time somewhat easier financial conditions in the Unit States broadened the demand for stockers and feeders. Both the forces were instrumental in causing a considerable movement Canadian cattle to markets south of the border. This increas movement is shown in Table 3. From January to May, inclusiv 1921, total imports from Canada averaged 13,000 head per mont This average fell to slightly over 6,000 head per month during t following three months. Beginning in September, however, wh the grazing season was near its close, the number imported ro greatly and averaged 23,000 per month until the end of the year.

(A) FROM PRINCIPAL COUNTRIES, BY MONTHS, 1921.

NUMBER (FREE).

Imported from—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Canada	15,260	7,319	10,416	20,168	12,194	339	8	77	19	98	37	28	65,963
Mexico	2,132	345	1,056	3,506	2,061	.....	.....	.....	.....	.....	.....	.....	9,100
United Kingdom	7	347	98	.....	222	53	.....	6	33	7	153	47	973
Virgin Islands	70	55	107	.....	21	.....	.....	69	.....	.....	58	.....	380
Total	17,469	8,066	11,677	23,674	14,498	392	8	152	52	105	248	75	76,416

NUMBER (DUTIABLE).

Canada	.....	.....	.....	.....	.....	2,750	5,015	10,469	18,760	28,429	35,801	12,221	113,445
Mexico	.....	.....	.....	.....	.....	1,010	34	327	.....	.....	1,906	1,497	4,774
Germany	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2
Total	.....	.....	.....	.....	.....	3,760	5,049	10,796	18,762	28,429	37,707	13,718	118,221

TOTAL NUMBER (FREE AND DUTIABLE).

Canada	15,260	7,319	10,416	20,168	12,194	3,089	5,023	10,546	18,779	28,527	35,838	12,249	179,408
Mexico	2,132	345	1,056	3,506	2,061	1,010	34	327	.....	.....	1,906	1,497	13,874
United Kingdom	7	347	98	.....	222	53	.....	6	33	7	153	47	973
Virgin Islands	70	55	107	.....	21	.....	.....	69	.....	.....	58	.....	380
Germany	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2
Total	17,469	8,066	11,677	23,674	14,498	4,152	5,057	10,948	18,814	28,534	37,955	13,793	194,637

VALUE (FREE).

Canada	$1,077,383	$380,820	$573,210	$670,945	$395,668	$68,084	$1,415	$18,825	$7,015	$19,395	$37,292	$24,235	$3,274,287
Mexico	55,625	7,013	27,980	71,815	29,040	.....	.....	.....	.....	.....	.....	.....	191,473
United Kingdom	986	123,498	66,970	.....	49,988	21,324	.....	11,397	9,120	5,241	59,409	31,073	379,003
Virgin Islands	3,709	3,170	6,117	.....	2,000	.....	.....	2,940	.....	.....	2,030	.....	19,966
Total	1,137,703	514,501	674,277	742,760	476,696	89,408	1,415	33,162	16,135	24,636	98,731	55,308	3,864,732

TABLE 3.—*Imports of cattle*—Continued.

(A) FROM PRINCIPAL COUNTRIES, BY MONTHS, 1921—Continued

VALUE (DUTIABLE).

Imported from—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Canada						$32,107	$71,170	$198,051	$301,622	$590,223	$733,875	$269,927	$2,196,975
Mexico						13,130	340	1,308			33,126	2,047	49,951
Germany									15				15
Total						45,237	71,510	199,359	301,637	590,223	767,001	271,974	2,246,941

TOTAL VALUE (FREE AND DUTIABLE).

Canada	$1,077,383	$380,820	$573,210	$670,945	$395,668	$100,191	$72,585	$216,876	$308,637	$609,618	$771,167	$294,162	$5,471,262
Mexico	55,625	7,013	27,980	71,815	29,040	13,130	340	1,308			33,126	2,047	241,424
United Kingdom	986	123,498	66,970		49,988	21,324		11,397	9,120	5,241	59,409	31,073	379,006
Virgin Islands	3,709	3,170	6,117		2,000			2,940			2,030		19,966
Germany									15				15
Total	1,137,703	514,501	674,277	742,760	476,696	134,645	72,925	232,521	317,772	614,859	865,732	327,282	6,111,673

(B) FROM PRINCIPAL COUNTRIES, 1911–1921.

Imported from—	Fiscal year.											
	1911		1912		1913		1914		1915		1916	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
FREE.												
Mexico	246	$2,803	40	$680			519,481	$8,337,638	346,004	$8,088,684	197,788	$4,084,271
Canada	354	71,228	309	51,367	425	$54,697	197,087	7,737,143	191,540	9,285,277	238,025	10,850,214
United Kingdom	1,821	285,950	1,780	253,175	963	179,792	1,784	254,038	623	139,214	1,161	191,170
All other countries	20	2,239									2,211	61,938
Total	2,441	362,220	2,129	305,222	1,388	234,489	718,352	16,328,819	538,167	17,513,175	439,185	15,187,593
DUTIABLE.[1]												
Mexico	177,735	2,517,533	315,187	4,463,917	391,477	5,430,259	105,772	1,407,905				
Canada	2,689	65,131	1,041	35,004	28,761	971,604	44,244	950,994				
United Kingdom	58	8,193	15	1,431	18	2,616						
All other countries					5	1,700						
Total	180,482	2,590,857	316,243	4,500,352	420,261	6,406,179	150,016	2,367,899				
TOTAL.												
Mexico	177,981	2,520,336	315,227	4,464,597	391,477	5,430,259	625,253	9,745,543	346,004	8,088,684	197,788	4,084,271
Canada	3,043	136,359	1,350	86,371	29,186	1,026,301	241,331	8,697,137	191,540	9,285,277	238,025	10,850,214
United Kingdom	1,879	294,143	1,795	254,606	981	182,408	1,784	254,038	623	139,214	1,161	191,170
All other countries	20	2,239			5	1,700					2,211	61,938
Total	182,923	2,953,077	318,372	4,805,574	421,649	6,640,668	868,368	18,696,718	538,167	17,513,175	439,185	15,187,593

[1] Figures for 1914 cover period from July 1 to Oct. 3, 1913, inclusive.

TABLE 3.—*Imports of cattle*—Continued.

(B) FROM PRINCIPAL COUNTRIES, 1911-1921—Continued.

Imported from—	Fiscal year.									
	1917		1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
FREE.										
Mexico	183,827	$4,201,987	105,470	$3,070,066	82,340	$2,462,317	82,760	$2,558,789	19,174	$518,057
Canada	189,285	8,498,113	185,089	14,377,487	356,834	34,282,030	489,690	41,865,349	304,532	22,318,378
United Kingdom	1,714	321,159	1,063	292,007	695	226,691	1,301	588,025	1,650	706,672
Virgin Islands			112	6,883	530	24,883	1,577	69,016	858	46,087
All other countries			1,985	105,733						
Total	374,826	13,021,259	293,719	17,852,176	440,399	36,995,921	575,328	45,081,179	326,214	23,589,124
DUTIABLE.										
Mexico									1,010	13,130
Canada									2,750	32,107
Total									3,760	45,237
TOTAL.										
Mexico	183,827	4,201,987	105,470	3,070,066	82,340	2,462,317	82,760	2,558,789	20,184	531,187
Canada	189,285	8,498,113	185,089	14,377,487	356,834	34,282,030	489,690	41,865,349	307,282	22,350,485
United Kingdom	1,714	321,159	1,063	292,007	695	226,691	1,301	588,025	1,650	706,672
Virgin Islands			112	6,883	530	24,883	1,577	69,016	858	46,087
All other countries			1,985	105,733						
Total	374,826	13,021,259	293,719	17,852,176	440,399	36,995,921	575,328	45,081,179	329,974	23,634,361

(B) FROM PRINCIPAL COUNTRIES, 1911-1921—Continued.

Imported from—	Calendar year.							
	1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
FREE.								
Canada	249,316	$22,317,247	550,004	$50,276,054	316,559	$24,491,888	65,963	$3,274,287
Mexico	100,632	2,917,027	90,541	2,724,419	58,926	1,847,851	9,100	191,473
Costa Rica	1,985	105,733						
United Kingdom	404	162,623	806	251,899	2,113	1,006,653	973	379,006
Virgin Islands	264	15,955	1,044	43,706	1,516	72,212	380	19,966
Total	352,601	25,518,585	642,395	53,296,078	379,114	27,418,604	76,416	3,864,732
DUTIABLE.								
Canada							113,445	2,196,975
Mexico							4,774	49,951
Germany							2	15
Total							118,221	2,246,941
TOTAL								
Canada	249,316	22,317,247	550,004	50,276,054	316,559	24,491,888	179,408	5,471,262
Mexico	100,632	2,917,027	90,541	2,724,419	58,926	1,847,851	13,874	241,424
Costa Rica	1,985	105,733						
United Kingdom	404	162,623	806	251,899	2,113	1,006,653	973	379,006
Virgin Islands	264	15,955	1,044	43,706	1,516	72,212	380	19,966
Germany							2	15
Total	352,601	25,518,585	642,395	53,296,078	379,114	27,418,604	194,637	6,111,673

It will be noted from Tables 1 and 2 that the emergency tariff was not followed by increased prices on the American markets. However, the fact that Canadian prices fell so much more than American prices after June 1 is of significance. Canada was on an export basis after June 1, i. e., her prices followed world prices, which declined greatly. Since Canadian prices fell far below the American level, it would seem logical that prices in the United States were held above the world level after June 1, 1921. However, it does not follow that American prices were held above the world level by the full amount of the duty.

In view of the foregoing it might at first seem odd that during the calendar year 1921 more live cattle were exported from the United States than at any time since 1909. However, more than 75 per cent of the cattle exported in 1921 went to Mexico and Cuba, chiefly the former. Parts of Mexico have been so stripped of live stock that heavy shipments from the Southwest were necessary to supply beef, the price of which was very high in Mexico in 1921. Some breeding animals also were sent in. Texas and the Southwest were the logical area in which to buy, owing to nearness and convenience in shipping. At the same time, the animals sent to Mexico for slaughter were, for the most part, of the domestic "cutter and canner" grade. This relieved domestic markets from some of the oversupply of those inferior animals. A small number of cattle, 31,324 head, was sent to Great Britain, chiefly before July 1. Thereafter only occasional small shipments were made, apparently of "bargain" animals secured by speculative exporters on days when the domestic markets were unduly depressed by unlooked for receipts. These small occasional shipments, averaging less than 1,100 per month from July to December, inclusive, were of no practical importance in the domestic markets. Table 4 shows domestic exports, by countries of destination, by months during 1921, and by years since 1910.

NUMBER.

Exported to—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Mexico	4,192	6,225	7,131	12,521	13,187	18,009	15,216	19,866	10,416	9,375	11,784	10,317	138,239
United Kingdom		302	1,560	6,963	10,456	5,654	2,596	487	1,652	1,082	202	370	31,324
Cuba	827	786	2,556	2,097	2,290	2,030	1,216	128	2,329	414	376	133	15,182
Canada	192	184	315	640	1,436	3,292	822	176	129	215	168	254	7,823
Belgium			280		680	400	453					200	2,013
Germany	742			743									1,485
All other countries	51	1	44	102	27	145	42	5	15	22	6	7	467
Total	6,004	7,498	11,886	23,066	28,076	29,530	20,345	20,662	14,541	11,108	12,536	11,281	196,533

VALUE.

Mexico	$173,288	$225,635	$283,560	$473,723	$506,648	$751,296	$571,734	$882,847	$393,083	$355,287	$281,373	$270,779	$5,179,263
United Kingdom		35,215	196,648	896,465	1,360,458	883,501	460,901	97,400	226,654	163,812	32,320	46,575	4,399,949
Cuba	64,429	49,613	129,747	107,742	103,899	76,471	47,675	5,080	114,455	24,574	15,753	6,277	745,715
Canada	7,070	19,834	29,245	50,637	191,302	189,426	116,192	19,202	17,789	21,125	38,548	28,029	728,399
Belgium			49,200		84,100	54,375	45,400					30,000	263,075
Germany	74,200			111,450									185,650
All other countries	25,414	1,000	11,850	22,150	18,000	138,175	50,200	1,125	3,000	5,550	420	1,635	278,519
Total	344,401	331,297	700,250	1,662,167	2,264,407	2,093,244	1,292,102	1,005,654	724,991	570,348	368,414	383,295	11,740,570

TABLE 4.—*Exports of cattle*—Continued.

(B) TO PRINCIPAL COUNTRIES, 1911-1921.

Exported to—	Fiscal year.											
	1911		1912		1913		1914		1915		1916	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Canada	7,890	$257,934	6,705	$244,918	11,691	$391,644	8,957	$330,005	751	$48,854	4,511	$162,515
Mexico	6,513	306,615	9,457	412,266	8,358	362,243	7,230	124,640	829	45,728	3,990	104,853
Bermuda	1,111	88,486	1,786	146,824	1,183	105,948	952	105,767	1,030	114,520	952	107,585
Cuba	328	12,330	476	11,585	127	5,220	506	34,418	186	5,420	826	47,307
Guatemala	152	7,020	42	3,778	52	5,282	176	8,525	15	985	17	4,365
Dominican Republic	3	755	1	135	37	2,908	133	4,885	96	4,620	62	3,205
United Kingdom	131,273	12,211,910	76,925	7,015,042	1,773	164,680					815	169,016
Belgium	2,332	233,200	9,515	954,080								
Argentina	15	7 000	3	1,000	23	2,950	10	2,610	10	5,000	56	37,300
Brazil	87	8,215	66	8,711	923	90,500	3	1,400	413	53,690	1	750
France									2,082	416,400	9,901	1,722,755
Germany												
All other countries	396	30,455	530	71,736	547	45,824	409	35,038	72	7,630	156	18,597
Total	150,100	13,163,920	105,506	8,870,075	24,714	1,177,199	18,376	647,288	5,484	702,847	21,287	2,378,248

Exported to—	Fiscal year.									
	1917		1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Canada	6,382	$462,728	7,286	$638,304	9,335	$749,357	6,596	$541,135	7,749	$803,747
Mexico	4,324	231,893	7,777	249,654	26,964	742,974	9,985	722,005	83,524	3,479,058
Bermuda	842	99,405	1,203	141,310			18	5,918	27	4,852
Cuba	1,476	88,456	1,607	142,880	5,013	257,545	19,921	1,215,302	20,653	1,758,662
Guatemala	57	4,855	2	100			33	9,705	40	18,900
Dominican Republic	3	215	26	4,359	8	750	71	7,645	271	18,850
United Kingdom			19	2,850			100	20,000	24,935	3,372,287
Belgium					530	185,500	33,512	6,550,641	5,685	945,211

(B) TO PRINCIPAL COUNTRIES, 1911-1921—Continued.

Exported to—	Calendar year.							
	1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Mexico	7,885	$256,116	23,923	$823,250	27,758	$1,478,779	138,239	$5,139,263
United Kingdom					100	20,000	31,324	4,399,949
Cuba	1,333	122,623	13,943	627,649	20,766	2,043,021	15,182	745,715
Canada	7,314	567,415	11,192	868,621	4,624	575,194	7,823	728,399
Belgium			9,067	1,759,021	29,300	5,734,656	2,013	263,075
Germany							1,485	185,650
Argentina			48	49,175	168	202,675	183	189,750
France			11,314	2,179,406	184	43,144	84	16,800
Honduras	19	2,450	13	1,900	30	4,070	51	11,175
Brazil	70	23,990	20	8,450	82	46,925	25	11,250
Bermuda	318	41,006	10	2,150	31	8,336	20	5,304
Uruguay			63	72,975	163	160,000	12	15,800
Japan	2	300	33	9,350	54	23,150	7	2,400
Ecuador	17	2,000	30	7,037	69	34,585	6	2,325
Panama	170	30,453	25	4,250	108	11,160	5	1,600
Dominican Republic			57	2,220	290	24,395	3	630
Guatemala			2	275	69	27,930	2	400
Peru	14	8,450	13	4,400	8	2,375	2	800
Australia					12	11,275	1	650
Nicaragua	106	13,740	30	5,020	282	5,560		
Chile	25	12,600	8	5,500	75	41,305		
Finland					850	170,000		
Philippine Islands					125	24,700		
All other countries	7	1,615	68	8,872	154	59,290	66	19,635
Total	17,280	1,082,758	69,859	6,439,521	85,302	10,752,525	196,533	11,740,570

Beef.—The wholesale beef market perhaps gives a better measure of the efficacy of the emergency tariff than the cattle market. The former is steadier, and sudden variations in cattle prices (which follow beef prices more or less closely) are smoothed out. The beef market in 1921 was appreciably affected by the depressed industrial conditions and diminished purchasing power of the consuming public. Pork and prepared meats moved more freely than beef, owing to smaller cuts and somewhat greater ease in preparation. Accordingly, the depressed cattle market would seem to have been fully reflected in the wholesale price of beef. Table 5 shows the decline in wholesale beef prices in the United States, Canada, England, and Argentina for the five months ended May 31 and the seven months ended December 31, 1921.

TABLE 5.—*Comparative prices of domestic and foreign beef.*

[Average price per 100 pounds, 1921.]

	Jan. 1–May 31.	June 1–Dec. 31.	Decline.	
			Amount.	Per cent.
New York, good steer beef	$17.00	$15.61	$1.39	8.2
Toronto, carcass No. 1	19.02	14.65	4.37	23.0
Winnipeg, carcass No. 1	14.22	11.27	2.95	20.7
London, English beef	27.79	19.54	8.25	29.7
London, Argentine chilled hind quarters	17.54	14.81	2.73	15.6
Buenos Aires, frigorifico steer, good	9.70	6.90	2.80	28.9
Buenos Aires, fat steer, frigorifico quality	8.96	6.80	2.16	24.1

There is no parity of grades in Table 5; the prices are tabulated merely to show the trend in world prices. It is manifest that in Toronto "carcass No. 1" is quite different in quality from that in Winnipeg, where virtually none but "grass fat" cattle are butchered. "English beef" has always commanded a large premium in the British market over imported chilled and frozen; with a glut of imported beef on the market, a large drop in the wholesale price of English beef would be expected. An oversupply in the world market would gravely affect prices in Argentina, since the export outlet was sharply curtailed and large cattle supplies were seeking a market. Wholesale prices in Australia declined even more sharply than in Argentina. The striking difference between New York and foreign markets, particularly the difference in percentage of price decline after June 1, 1921, would seem to indicate clearly that American prices were held above the world level, following the enactment of the emergency tariff.

Table 6 shows imports into the United States of beef and other meats during 1920 and 1921. Comparing the two periods from January to May and June to December, 1920 and 1921, the already small imports of beef appear to have been further curtailed after June 1, 1921, by a combination of causes—the duty, shipping costs, and a preference for domestic beef which is superior in quality because it is produced from corn-fed cattle. This slump in imports occurred despite the serious glut of beef in the world markets during the last half of 1921. It should be noted, however, that imports of beef in both 1920 and 1921, about 80 per cent of which was chilled beef from

Canada, amounted to less than 1 per cent of domestic production. The small import balance of 1920 and 1921 resulted entirely from the beef equivalent of live cattle imported almost entirely from Canada.

Only 41,000,000 pounds of fresh, canned, and pickled and other cured beef were exported from the United States in 1921, as compared with nearly 140,000,000 pounds in 1920 and 171,000,000 pounds in 1919. Of the 1921 exports, 75 per cent consisted of canned, pickled, and other cured, which are special products for special markets widely scattered in North and South America, Europe, and, in fact, throughout the world. These products compete only indirectly with fresh beef. Of the 10,412,790 pounds of fresh beef exported in 1921, practically 80 per cent was sent out prior to June 1.

TABLE 6.—*Imports of fresh and prepared and preserved meat, 1920 and 1921.*

[Quantity in pounds.]

Date.	Fresh meats.						Prepared and preserved meat.			Sausage casings.	Tallow.	All other meat products.
	Beef and veal.				Mutton and lamb.	Pork.	Bacon and hams.	Bologna sausage.	All other.			
	Total.	From Canada.	From Argentina.	From Australia.								
1920.												
January	2,717,414	1,209,700	84,119	293,519	864,561	127,155	80,550	15,004	198,998	899,618	665,707	388,458
February	2,276,408	1,532,100	.....	167,835	850,243	234,013	23,772	7,339	64,232	648,116	149,120	351,959
March	2,981,915	2,185,648	.....	310,265	744,174	45,249	47,483	3,034	144,451	404,921	1,002,866	292,803
April	5,195,400	4,240,722	.....	228,849	2,358,858	69,611	113,580	10,450	658,593	1,000,049	222,927	326,782
May	4,138,798	2,427,904	1,026,770	364,816	5,253,962	148,410	38,401	1,508	821,228	1,325,476	893,277	449,059
June	5,819,305	3,630,699	.....	243,137	2,033,200	50,896	7,291	10,680	170,824	1,042,738	1,134,688	982,222
July	2,778,844	2,037,793	.....	.....	5,181,526	33,877	102,025	5,143	1,275,119	2,205,706	1,240,332	1,188,784
August	5,618,896	5,437,659	.....	125	13,956,578	47,959	107,713	25,726	736,335	1,608,110	2,380,415	533,585
September	5,808,068	4,782,858	872,790	134,893	18,460,700	50,560	60,286	3,727	544,630	752,666	1,651,754	500,108
October	5,251,153	3,334,870	444,714	188,830	27,024,972	539,355	118,462	19,251	1,582,408	857,604	3,812,366	536,702
November	5,437,271	4,694,844	.....	156,277	13,791,198	68,810	41,998	12,573	383,182	770,259	245,433	498,986
December	2,158,633	1,973,628	.....	179,879	10,648,347	125,114	13,174	42,300	619,037	621,082	1,535,752	1,398,561
Total	50,182,105	37,488,425	2,428,393	2,268,419	101,168,319	1,541,009	754,735	156,735	7,199,037	12,136,345	14,934,637	7,448,009
1921.												
January	4,273,228	2,192,650	774,891	180,326	13,864,205	37,492	16,782	18,099	338,885	704,399	1,538	677,892
February	1,167,706	879,675	9,516	43,515	4,980,140	33,183	59,100	3,845	192,217	747,058	37,344	650,147
March	1,741,384	1,703,306	.....	37,277	415,955	138,539	29,041	18,940	267,627	1,120,888	25,584	449,271
April	2,571,947	2,172,282	.....	351,001	53,380	39,341	49,317	5,983	144,658	663,983	50,558	475,799
May	3,293,252	2,719,680	.....	455,317	47,387	30,207	8,754	8,106	249,066	973,648	123,032	320,797
June	1,855,874	1,319,740	251,280	64,656	103,826	68,058	.....	.....	[1] 250,510	1,044,134	718,491	72,506
July	1,922,534	1,171,713	.....	38,055	113,801	11,916	.....	.....	[1] 242,589	969,931	57,718	66,773
August	3,141,482	2,752,052	.....	.....	617,243	20,410	.....	.....	[1] 313,684	758,288	.....	162,762
September	2,065,569	1,907,069	.....	.....	1,237,402	56,047	.....	.....	[1] 303,518	729,727	44,264	422,808
October	3,561,848	3,449,284	.....	16,063	1,301,338	226,180	.....	.....	[1] 157,507	470,269	549,690	285,816
November	3,361,417	3,225,081	.....	.....	1,244,103	46,873	.....	.....	[1] 239,146	876,952	255,660	574,708
December	3,421,681	2,915,908	.....	6,548	1,416,208	107,847	.....	.....	[1] 344,241	870,877	4,633	1,484,064
Total	32,377,922	26,408,500	1,035,687	1,192,758	25,394,988	816,093	162,994	54,973	[1] 3,043,648	9,930,154	1,868,512	5,643,403

June to December, inclusive..	32,814,170	25,892,351	1,317,504	903,141	91,096,521	[illegible]	[illegible]					
1921.												
January to May, inclusive....	13,047,517	9,667,653	784,407	1,067,436	19,361,067	278,762	162,994	54,973	1,192,453	4,209,976	238,056	2,573,906
June to December, inclusive..	19,330,405	16,740,847	251,280	125,322	6,033,921	537,331	.....	.....	1,851,195	5,720,178	1,630,456	3,099,497

[1] Includes "canned meats" as follows:

	Pounds.
June	7,779
July	6,335
August	89,242
September	7,502
October	57,712
November	8,431
December	12,297
Total	189,298

Table 7 shows imports and exports of fresh beef and veal by countries during recent years, and suggests the source of greatest potential competition which must be faced by the domestic cattleman in his home market.

TABLE 7.—*Imports and exports of fresh beef and veal, 1914–1921.*

GENERAL IMPORTS.

Year.	Imported from—						Total.
	United Kingdom.	Canada.	Argentina.	Uruguay.	Australia.	All other countries.	
Fiscal year:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1914[1]	57,539,975	15,919,799	59,744,937	25,902,732	19,858,526	1,141,214	180,137,183
1915	8,676,776	15,305,264	130,680,021	13,802,565	10,482,128	5,544,005	184,490,759
1916	.....	9,918,326	52,680,436	192,229	.....	8,310,765	71,101,756
1917	.....	9,435,742	2,295,690	86,662	201,641	3,197,373	15,217,118
1918	.....	20,768,167	431,041	13,120	569,053	3,670,274	25,451,655
Calendar year:							
1919	.....	31,124,474	261,001	94,426	1,528,138	5,453,719	38,461,758
1920	19,655	37,488,425	2,428,393	1,090,284	2,444,431	6,710,917	50,182,105
1921	.....	26,469,120	1,050,962	455,819	1,192,758	3,209,263	32,377,922

DOMESTIC EXPORTS.

Year.	Exported to—						Total.
	United Kingdom.	Canada.	Panama.	France.	Italy.	All other countries.	
Fiscal year:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Average 1910–1914	23,410,437	372,614	5,026,662	.....	20,279	622,310	29,452,302
1915	54,497,192	545,356	3,706,596	99,620,095	10,472,425	1,599,270	170,440,934
1916	117,409,488	3,192,196	1,504,583	49,100,444	47,887,945	12,119,344	231,214,000
1917	125,687,523	17,771,159	235,034	38,042,278	13,066,277	2,374,832	197,177,101
1918	285,789,315	37,349,521	144,442	36,926,941	8,566,613	1,256,068	370,032,900
Calendar year:							
1919	73,073,602	2,621,011	51,950	.....	21,375,473	77,304,961	174,426,999
1920	5,699,488	2,330,963	88,537	730,217	211,447	80,590,496	89,649,148
1921	2,180,902	228,624	317,522	.....	.....	7,685,742	10,412,790

[1] Included in "All other meats" prior to 1914.

As a summary of the foregoing, Table 8 shows the annual production, imports, and exports of cattle and of beef during recent years.

TABLE 8.—*Domestic production, imports, and exports of cattle and beef, 1900–1921.*

[Calendar year.]

Year.	Number of cattle on farms.	Cattle (in thousands).				Beef and veal (in millions of pounds).		
		Number slaughtered.		Imports.[2]	Exports.[2]	Domestic production.	Imports.[2]	Exports.[2]
		Cattle.	Calves.					
1900	57,721	.....	.....	175	397	.....	.....	329
1909	[1] 61,804	13,611	6,516	140	208	7,755	.....	123
1914	[1] 56,592	11,005	4,661	872	18	6,072	180	7
1915	58,329	10,822	4,640	539	5	6,244	184	170
1916	61,920	12,027	5,774	447	21	6,654	71	231
1917	64,583	13,724	7,031	374	13	7,348	15	197
1918	67,422	15,750	7,767	294	18	8,367	25	370
1919	68,560	13,635	9,041	642	70	7,422	38	174
1920	68,369	12,848	9,223	379	85	7,020	50	90
1921	66,191	12,271	8,655	195	197	7,058	32	10

[1] Fiscal years until 1919. [2] 1910. [3] Estimate of the U. S. Department of Agriculture after 1910.

SHEEP AND MUTTON.

The tariff act of 1909 placed a duty of $1.50 per head on sheep 1 year old or over, and 75 cents per head on sheep less than 1 year old. The duty on lamb and mutton was 1½ cents per pound. The act of 1913 placed both sheep and mutton on the free list. The emergency tariff (May 28, 1921) levied a duty of $2 per head on sheep 1 year old or over, and $1 per head on animals less than 1 year old. The duty on fresh mutton and lamb was 2 cents per pound.

In the case of both sheep and mutton, the American import and export trade normally is very small. During recent years relatively small numbers have entered from Mexico for consumption, and these were chiefly sacrifice sales by ranchers south of the border who had to adopt that expedient to avoid confiscation of their stock. Some animals have been imported from Canada, almost entirely for consumption, but additions to domestic supplies from both these sources have been small. Tables 9 and 10 show imports and exports of live animals by fiscal years since 1910, and for the last four calendar years. During the last four years imports have averaged only 158,000 head, chiefly from Canada; exports have averaged only 52,000 head, chiefly to Mexico. Total domestic slaughter has averaged about 15,000,000 head during the past four years, i. e., the imports have amounted to only 1 per cent of domestic slaughtering.

TABLE 9.—*Imports of sheep, 1911–1921.*

Imported from—	Fiscal year.											
	1911		1912		1913		1914		1915		1916	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
FREE.												
Mexico			1,601	$4,803			205,462	$396,921	106,526	$219,446	138,743	$291,625
Canada	4,311	$87,708	2	45	294	$4,491	15,603	91,341	46,021	279,931	96,552	610,237
United Kingdom	1,030	28,569	605	24,258	75	3,396	752	27,368	719	31,655	205	8,409
New Zealand							12	1,023	27	830	133	6,480
All other countries					19	1,016	7	259	24	2,105	26	751
Total	5,341	116,277	2,208	29,106	388	8,903	221,836	516,912	153,317	533,967	235,659	917,502
DUTIABLE.[1]												
Canada	44,590	237,960	17,627	107,320	11,618	67,985	1,800	15,486				
Mexico	3,050	14,330	3,551	14,125	3,372	12,312	1	3				
United Kingdom	474	9,058	197	6,696	39	805						
All other countries			5	10	11	16	2	3				
Total	48,114	261,348	21,380	128,151	15,040	81,118	1,883	15,492				
TOTAL.												
Mexico	3,050	14,330	5,152	18,928	3,372	12,312	205,463	396,924	106,526	219,446	138,743	291,625
Canada	48,901	325,668	17,629	107,365	11,912	72,476	17,483	106,827	46,021	279,931	96,552	610,237
United Kingdom	1,504	37,627	802	30,954	114	4,201	752	27,368	719	31,655	205	8,409
New Zealand							12	1,023	27	830	133	6,480
All other countries			5	10	30	1,032	9	262	24	2,105	26	751
Total	53,455	377,625	23,588	157,257	15,428	90,021	223,719	532,404	153,317	533,967	235,659	917,502

Imported from—	Fiscal year.									
	1917		1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
FREE.										
Mexico	97,202	$296,807	39,879	$170,759	37,592	$221,711	17,073	$103,036	2,357	$13,600
Canada	62,566	535,595	136,239	1,716,394	124,644	1,641,317	181,166	2,087,019	158,491	1,504,353
United Kingdom	249	10,376	1,128	70,678	964	47,738	1,007	63,597	380	22,407
New Zealand	405	13,867	435	21,915	33	2,490	300	26,187	15	1,222
All other countries	.....	.....	.....	.....	50	1,217	3	110	.....	.....
Total	160,422	856,645	177,681	1,979,746	163,283	1,914,473	199,549	2,279,949	161,243	1,541,582
DUTIABLE.										
Canada	.....	.....	.....	.....	.....	.....	.....	.....	49	211
Total	.....	.....	.....	.....	.....	.....	.....	.....	49	211
TOTAL.										
Mexico	97,202	296,807	39,879	170,759	37,592	221,711	17,073	103,036	2,357	13,600
Canada	62,566	535,595	136,239	1,716,394	124,644	1,641,317	181,166	2,087,019	158,540	1,504,564
United Kingdom	249	10,376	1,128	70,678	964	47,738	1,007	63,597	380	22,407
New Zealand	405	13,867	435	21,915	33	2,490	300	26,187	15	1,222
All other countries	.....	.....	.....	.....	50	1,217	3	110	.....	.....
Total	160,422	856,645	177,681	1,979,746	163,283	1,914,473	199,549	2,279,949	161,292	1,541,793

[1] Figures for 1914 cover period from July 1 to Oct. 3, 1913, inclusive.

TABLE 9.—*Imports of sheep, 1911-1921*—Continued.

Imported from—	Calendar year.							
	1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
FREE.								
Canada	102,589	$1,367,324	190,718	$2,199,348	165,455	$1,645,881	7,981	$72,575
Mexico	46,065	200,998	32,828	197,269	7,010	52,867	2,357	13,600
United Kingdom	1,121	64,397	1,007	63,597	308	17,182	126	10,309
New Zealand	428	20,998	171	11,955	129	14,232	22	1,672
All other countries	.....	.....	50	1,217	3	110	.....	.....
Total	150,203	1,653,717	224,774	2,473,386	172,905	1,730,272	10,486	98,156
DUTIABLE.								
Canada	.....	.....	.....	.....	.....	.....	74,233	373,139
New Zealand	.....	.....	.....	.....	.....	.....	20	715
Total	.....	.....	.....	.....	.....	.....	74,253	373,854
TOTAL FREE AND DUTIABLE.								
Canada	102,589	1,367,324	190,718	2,199,348	165,455	1,645,881	82,214	445,714
Mexico	46,065	200,998	32,828	197,269	7,010	52,867	2,357	13,600
United Kingdom	1,121	64,397	1,007	63,597	308	17,182	126	10,309
New Zealand	428	20,998	171	11,955	129	14,232	42	2,387
All other countries	.....	.....	50	1,217	3	110	.....	.....
Total	150,203	1,653,717	224,774	2,473,386	172,905	1,730,272	84,739	472,010

TABLE 10.—*Exports of sheep, 1911–1921.*

Exported to—	Fiscal year.											
	1911		1912		1913		1914		1915		1916	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Canada	78,293	$291,003	122,398	$399,657	175,193	$528,368	145,715	$464,756	45,500	$165,953	48,149	$195,879
Bermuda	1,384	9,574	1,975	14,616	2,096	20,705	2,457	17,992	1,081	8,592	1,530	12,945
United Kingdom	37,038	282,530	18,885	134,112	1,907	13,979	2,210	16,214	.....	.....	1	35
Mexico	2,097	19,048	12,059	48,042	5,831	18,764	670	6,729	421	4,915	.....	.....
Belgium	1,065	8,520	500	4,000	.....	.....	635	5,080	.....	.....	.....	.....
Panama	.....	.....	3	19	1,333	8,734	114	610	108	950	1,977	13,868
Cuba	91	644	52	210	.....	.....	30	2,090	.....	.....	53	1,030
All other countries	1,523	24,953	1,391	26,329	682	15,175	769	21,072	103	1,868	568	7,778
Total	121,491	636,272	157,263	626,985	187,132	605,725	152,600	534,543	47,213	182,278	52,278	231,535

Exported to—	Fiscal year.									
	1917		1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Canada	56,648	$341,863	6,534	$69,471	15,151	$169,049	25,698	$243,253	18,192	$132,764
Bermuda	812	8,717	400	9,267	.....	.....	54	744	273	2,549
United Kingdom	16	87	.....	.....	.....	.....	.....	.....	8,629	75,950
Mexico	.....	.....	.....	.....	501	6,728	32,294	424,588	49,018	218,589
Belgium	.....	.....	.....	.....	.....	.....	170	6,080	.....	.....
Panama	511	4,893	.....	.....	.....	.....	.....	.....	90	1,964
Cuba	3	150	26	554	152	2,012	422	3,450	3,769	29,090
All other countries	821	12,225	999	17,736	313	9,558	517	33,434	752	71,595
Total	58,811	367,935	7,959	97,028	16,117	187,347	59,155	711,549	80,723	532,510

TABLE 10.—*Exports of sheep, 1911–1921*—Continued.

Exported to—	Calendar year.							
	1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Mexico	115	$1,810	4,421	$74,746	39,630	$416,337	78,291	$285,467
Canada	7,512	104,580	29,620	273,924	6,724	58,582	26,402	194,969
United Kingdom					2	12	9,195	85,035
Cuba	20	404	257	3,637	1,224	8,559	2,964	23,121
Bermuda					56	759	271	2,534
Japan	93	5,800	176	12,242	729	69,450	65	3,900
Argentina			4	800			55	5,400
Peru	12	1,200			5	480	10	750
Brazil	10	1,030			5	900	2	500
France					198	6,336		
British West Africa	190	3,390						
Belgium					170	6,080		
All other countries	10	2,668	53	4,625	135	4,195	141	3,057
Total	7,962	120,882	34,531	369,974	48,878	571,690	117,396	604,733

Exports of mutton and lamb have been insignificant in amount, and until the early summer of 1920 imports of mutton and lamb also have been relatively small. They have come chiefly from Canada. The United States is not a mutton-eating country; the average per capita consumption from 1917 to 1920, inclusive, was only 5.5 pounds, as compared with 69 pounds of beef and veal and 68 pounds of pork and lard. In Great Britain about five times as much mutton is eaten per capita. Domestic supplies of lamb and mutton (averaging 547,000,000 pounds for 1917 to 1920) have been ample for domestic needs. Imports for 1914 to 1919, inclusive, averaged less than 7,000,000 pounds a year, or less than 1½ per cent of production in the United States. A decided preference for domestic chilled mutton and lamb, the small duty per pound until 1913, and shipping scarcity until about 1920 have made impracticable other than trifling importations of foreign frozen meat.

However, owing mainly to efforts to move more rapidly heavy war-time accumulations in the hands of the British Government, 116,000,000 pounds of frozen lamb and mutton (an amount equal to 20 per cent of the domestic production) were imported between early summer of 1920 and the middle of the following winter. This was a costly venture for the importers, who lost heavily and had to reexport over half the amount brought in. After a brief flurry the consumers neglected these frozen stocks, which usually retailed at little less than domestic chilled, although wholesaled at much below the domestic product.[4] But the presence of these stocks had a serious effect on the domestic sheep market during 1920 and 1921, as is shown below.

The sheepmen were in even a worse position than the cattlemen to withstand adverse markets for sheep and lambs during the last half of 1920. On the average, in the United States during recent years wool has been approximately as important as sheep and lambs in total flock receipts. The wool market suddenly became moribund in the latter part of May, 1920,[5] and the clip was virtually unsalable. Market quotations were nominal; most of the clip was still owned by the growers at the end of the year. In fact, a considerable part of the 1920 clip was not sold until nearly the close of 1921, although normally nearly all of it passes into second hands within a few months after shearing. The sudden collapse of the wool market largely wiped out income from wool in 1920 for most flockmasters, while the depressed lamb market greatly curtailed receipts from that source. Where ordinarily the price of lambs averages 5 to 10 per cent lower during the last seven months of the year than during the first five months, in 1920 they averaged 31 per cent lower—$13.10 per 100 pounds, compared with $18.90. In that summer the price of native beef steers advanced slightly on the Chicago market, as is customary; they averaged $13.70 during the last seven months of 1920, as compared with $12.95 during the first five months.

With both classes of live stock, forced liquidation was the rule. Bankers were demanding curtailment of heavy loans made necessary during the adverse seasons just preceding, and the markets were glutted in the autumn of 1920 in an effort to satisfy creditors. Since

[4] In one case the wholesale price of domestic chilled lamb and mutton was 28 cents per pound; imported frozen, 17½ cents. The retail price was substantially the same.

[5] See page 28; also report of U. S. Tariff Commission on The Wool-Growing Industry pp. 14, 15.

enormous supplies of foreign frozen lamb were present and immediately available to distributors, the inevitable post-war decline in sheep and lamb prices was greatly accentuated. Instead of the customary rise after the peak of autumn marketings has passed, on the Chicago market from January 1 to May 31, 1921, aged lambs averaged only $10.10 per 100 pounds, or 26 per cent lower than during the last seven months of 1920, when they averaged $13.70 per 100 pounds, and nearly 50 per cent lower than during the first five months of 1920, when they averaged $18.90.

Unfortunately for the sheepmen, forced liquidation continued throughout a large part of 1921, and with the exception of 1919, the 1921 market receipts of sheep and lambs were larger than at any time since 1914.* These receipts contained an unusual percentage of female lambs, animals which should have been retained for flock maintenance, but which had to be marketed to satisfy creditors. The breeding flocks, already too largely composed of old ewes, thus moved still further toward the point where they become a liability rather than an asset; i. e., when heavy losses, especially during the winter and lambing seasons, not only wipe out all chances for profit but make certain a net loss.

Since forced marketings after June 1, 1921, gave supplies amply sufficient for the lessened domestic demand, the emergency tariff was unable to raise domestic prices. However, as with cattle, prices become firmer, and the spread which prevailed between Chicago and the Canadian markets during the first five months of 1921 widened greatly after June 1 (see Tables 1 and 2, pp. 4 and 6). There was an open market in the United States until June 1, with only a narrow spread between domestic and Canadian markets, but the latter remained on a world level after June 1, and just as with cattle, Canadian markets continued downward as the world price declined. The widened price differential between the United States and Canada would seem to indicate that the emergency tariff held the domestic sheep and lamb market somewhat abovethe world level after June 1. World and Canadian prices fell so low at the end of the grazing season that, although smaller than in previous years, considerable imports of live animals were received from Canada during the autumn despite the tariff. Table 11 shows the imports of live sheep and lambs during 1921, and Table 12 shows exports. As with cattle, the bulk of the small exports went to Mexico. Most of the rest represented a border trade with Canada. The total exports were of but negligible importance compared with domestic slaughter.

* In 1921, receipts of sheep and lambs at all public stockyards amounted to 24,168,032 head as compared with 27,256,345 in 1919 and 23,537,534 in 1920. On the other hand, cattle receipts fell steadily from 25,294,557 head in 1918 to 19,786,794 in 1921.

NUMBER (FREE).

Imported from—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Canada	4,332	189	1,241	41	152	1,800	3	118	7	3	3	92	7,981
Mexico	900			1,193	264								2,357
United Kingdom		72									54		126
New Zealand						15	7						22
Total	5,232	261	1,241	1,234	416	1,815	10	118	7	3	57	92	10,486

NUMBER (DUTIABLE).

Canada						49	846	9,957	31,911	18,607	11,380	1,483	74,233
New Zealand									20				20
Total						49	846	9,957	31,931	18,607	11,380	1,483	74,253

TOTAL NUMBER (FREE AND DUTIABLE).

Canada	4,332	189	1,241	41	152	1,849	849	10,075	31,918	18,610	11,383	1,575	82,214
Mexico	900			1,193	264								2,357
United Kingdom		72									54		126
New Zealand						15	7		20				42
Total	5,232	261	1,241	1,234	416	1,864	856	10,075	31,938	18,610	11,437	1,575	84,739

VALUE (FREE).

Canada	$43,544	$1,641	$10,000	$1,011	$1,116	$9,189	$80	$2,024	$165	$95	$55	$3,655	$72,575
Mexico	4,500			6,770	2,330								13,600
United Kingdom		5,225									5,084		10,309
New Zealand						1,222	450						1,672
Total	48,044	6,866	10,000	7,781	3,446	10,411	530	2,024	165	95	5,139	3,655	98,156

TABLE 11.—*General imports of sheep, by months, calendar year 1921*—Continued.

VALUE (DUTIABLE).

Imported from—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Canada						$211	$4,414	$48,821	$162,643	$87,939	$58,905	$10,206	$373,139
New Zealand									715				715
Total						211	4,414	48,821	163,358	87,939	58,905	10,206	373,854

TOTAL VALUE (FREE AND DUTIABLE).

Canada	$43,544	$1,641	$10,000	$1,011	$1,116	$9,400	$4,494	$50,845	$162,808	$88,034	$58,960	$13,861	$445,714
Mexico	4,500			6,770	2,330								13,600
United Kingdom		5,225									5,084		10,309
New Zealand						1,222	450		715				2,387
Total	48,044	6,866	10,000	7,781	3,446	10,622	4,944	50,845	163,523	88,034	64,044	13,861	472,010

TABLE 12.—*Domestic exports—Sheep,*

CALENDAR YEAR 1921, BY MONTHS.

NUMBER.

Exported to—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Mexico	3,209	6,033	1,064	6,780	7,057	13,509	13,335	10,453	7,207	5,097	2,742	1,805	78,291
Canada	5	20	300	3,241	2,303	9,517	2,342	6,102	1,530	554	264	224	25,402
United Kingdom		2,008	2,002	4,137	480					568			9,195
Cuba	536	419	629	591	258	399						102	2,964
Bermuda	271												271
British Guiana								50		25	25	25	125
Japan							65						65
Argentina						55							55
Peru			10										10
Chile	6												6
Dominican Republic	2	3											5
Other British West Indies		3					2						5
Brazil						2							2
Total	4,059	8,486	4,005	14,749	10,098	23,482	15,744	16,605	8,737	6,244	3,031	2,156	117,396

VALUE.

Mexico	$11,821	$44,476	$8,059	$22,137	$25,835	$43,734	$44,433	$37,556	$18,556	$16,368	$8,772	$2,720	$285,467
Canada	41	1,205	2,500	25,552	19,151	62,591	22,203	40,739	10,246	2,979	3,252	4,510	194,969
United Kingdom		13,402	17,161	41,084	4,300					9,088			85,035
Cuba	6,004	2,401	4,820	4,474	1,657	3,000						765	23,121
Bermuda	2,534												2,534
British Guiana								411		282	230	299	1,192
Japan							3,900						3,900
Argentina						5,400							5,400
Peru			750										750
Chile	1,400												1,400
Dominican Republic	100	15											115
Other British West Indies		150					200						350
Brazil						500							500
Total	21,900	61,649	33,290	93,247	51,943	115,225	70,736	78,706	28,802	28,717	12,254	8,264	604,733

Table 6, page 18, shows the pronounced drop in mutton and lamb imports in 1921. Most of the imports after June 1 came from Canada in the form of chilled mutton and lamb. The bulk of the imports prior to June 1 consisted of Australasian frozen. The duty and shipping charges, as well as preference for domestic chilled, and the costly experience with imported frozen, virtually eliminated the latter from our import trade by midwinter of 1921.

WOOL.

The tariff act of 1909 placed a duty of 11 cents per pound on wools of Class I (clothing), 12 cents per pound on Class II (English combing) and on Class III, 4 cents per pound if valued at not more than 12 cents per pound; if valued at more than 12 cents per pound the duty was 7 cents per pound. Class I wools bore a duty of 22 cents per pound if imported in the washed condition, while Classes I and II paid 33 cents per pound if imported in the scoured condition. The act of 1913 put wool on the free list. The emergency tariff (May 28, 1921) left Class III wools on the free list, but levied a duty of 15 cents per pound on Classes I and II if imported in the condition as shorn from the sheep, 30 cents per pound if washed, or if altered in any way from the condition as shorn from the sheep, and 45 cents on scoured wool.

There has been a tariff problem in wool for more than a century. The acuteness of this problem has varied with conditions. Between about 1885 and 1917, although nearly arrested between 1900 and 1910, there was a considerable decline in total number of sheep in the United States. On the other hand, despite the smaller number of sheep kept, the average annual production of wool has varied but little throughout most of this 35-year period from the figure reached in 1883, i. e., 300,000,000 [7] pounds. This resulted from improved breeding and selection and steady increase in average weight of fleece shorn. Since the population of the United States increased steadily during this time, more wool had to be imported to supply the demand. Therefore, the average annual imports for consumption for the 12 years ending in 1915, amounting to 213,000,000 pounds per year, were practically one-third larger than for the preceding 12 years. Production and imports of wool, and imports of other animal fiber, by classes and by years, are presented in the following table:

[7] See report of U. S. Tariff Commission, on the Wool-Growing Industry, 1921, p. 21; and A Brief History of the Sheep Industry, in Ann. Report. Am. Historical Asso., 1918, p. 192.

[Quantity in pounds.]

Year.	Class I, wool.	Class II.				Class III.			Total wool, Classes I, II, and III.	Total camel's hair, Classes II and III.	Total hair of the Angora goat, alpaca, etc., Class II.	Grand total.	Domestic production (000 omitted).
		Wool.	Camel's hair.	Hair of the Angora goat, alpaca, and other like animals.	Total.	Wool.	Camel's hair.	Total.					
Fiscal year—													
1900	19,369,622	8,454,325	126,762	1,329,892	9,910,979	97,650,768	1,319,576	98,970,344	125,474,715	1,446,338	1,329,892	128,250,945	288,637
1901	35,806,019	6,590,739	3,931	739,419	7,334,089	80,725,075	997,868	81,722,943	123,121,833	1,001,799	739,419	124,863,051	302,502
1902	55,203,457	5,949,969	2,325	793,649	6,745,943	97,785,611	702,719	98,487,730	158,938,437	705,044	793,649	160,437,130	316,341
1903	46,667,412	12,494,579	80	1,243,749	13,738,408	117,400,891	1,844,327	119,245,218	176,562,882	1,844,407	1,243,749	179,651,038	287,450
1904	39,927,770	11,427,860	.....	2,231,340	13,659,200	105,430,905	2,702,132	108,133,037	156,786,535	2,702,132	2,231,340	161,720,007	291,783
1905	76,709,197	19,296,833	.....	2,625,575	21,922,408	110,086,286	2,509,591	112,595,877	206,152,316	2,509,591	2,625,575	211,287,482	295,488
1906	93,488,590	15,086,504	1,720	1,298,930	16,387,154	107,167,736	2,451,530	109,619,266	215,742,830	2,453,250	1,298,930	219,495,010	298,915
1907	91,504,587	9,885,998	.....	2,191,547	12,077,545	90,242,134	2,210,985	92,453,119	191,632,719	2,210,985	2,191,547	196,035,251	298,295
1908	60,622,216	9,936,510	89,903	1,468,800	11,495,213	62,633,615	1,219,863	63,853,478	133,192,341	1,309,766	1,468,800	135,970,907	311,138
1909	99,959,006	16,585,692	.....	1,308,073	17,891,765	87,224,962	4,140,593	91,365,555	203,769,660	4,140,593	1,305,073	209,216,326	328,111
1910	112,059,780	24,809,262	112	1,967,006	26,776,380	115,100,867	2,669,611	117,770,478	251,959,909	2,669,723	1,967,006	256,606,638	321,363
1911	58,233,939	8,862,736	26,694	2,726,524	11,615,954	92,580,769	3,470,177	96,050,946	159,677,444	3,496,871	2,726,524	165,900,839	318,548
1912	69,345,885	8,858,446	55,911	2,029,925	10,944,282	109,643,928	3,836,627	113,480,555	187,848,259	3,892,538	2,029,925	193,770,722	304,043
1913	62,026,578	11,598,126	838,082	1,195,054	13,631,262	92,197,685	3,735,635	95,933,320	165,822,389	4,573,717	1,195,054	171,591,160	296,175
1914	171,4 4,445	21,629,867	20,293	3,555,950	25,206,110	127,075,301	3,694,934	130,770,235	329,149,613	3,715,227	3,555,950	327,420,790	290,192
1915	218,073,488	15,050,489	26,120	4,682,824	19,759,433	63,817,702	1,602,277	65,479,979	296,941,679	1,688,397	4,682,824	303,312,900	288,777
1916	402,656,014	12,812,878	287,025	9,349,854	22,449,757	107,708,791	1,729,549	109,438,340	523,177,683	2,016,574	9,349,854	534,544,111	285,726
1917	279,480,038	16,172,577	883,376	9,367,801	26,423,754	67,412,761	261,967	67,674,728	363,065,376	1,145,343	9,367,801	373,578,520	288,490
1918	303,941,562	12,686,235	925,250	1,826,602	15,438,087	58,876,958	278,208	59,155,166	375,504,755	1,203,458	1,826,602	378,534,815	281,892
Calendar year—													
1918	374,101,453	3,638,617	888,926	5,162,386	9,669,929	68,696,633	452,971	69,149,604	446,436,703	1,321,897	5,162,386	452,920,986	299,921
1919	334,523,510	7,404,045	330,036	6,123,123	13,857,204	95,732,470	790,902	96,523,372	437,660,025	1,120,938	6,123,123	444,904,086	313,638
1920	212,453,148	4,177,602	2,465,737	4,435,711	11,079,050	35,549,300	259,443	35,808,743	252,180,050	2,725,180	4,435,711	259,340,941	302,207
1921	195,658,603	[1] 9,611,648	524,974	5,172,269	15,308,891	97,838,700	190,567	98,029,267	303,109,041	715,511	5,172,269	308,996,851	273,004

[1] Under the emergency tariff of 1921 camel's hair is included in wool.

Of the 213,000,000 pounds of wool, mohair, etc., imported per year from 1904 to 1915, approximately 100,000,000 pounds consisted of Class III, or carpet fiber. Most of the rest was composed of wools grown in South America and Australasia. Since the domestic clip amounted to an average of about 300,000,000 pounds, it furnished three-fifths of the total annual consumption of slightly more than 500,000,000 pounds of grease wool. As the domestic clip contained almost no carpet wools, it supplied three-fourths of the annual consumption of wools used in the manufacture of clothing—slightly over 400,000,000 pounds. Despite some increase in the domestic clip after 1915, the war emergency necessitated average annual imports of practically twice as much wool from 1916 to 1919, inclusive, as during the preceding 12 years. All of the increase consisted of Class I and II fiber. During these years, therefore, the domestic clip furnished only three-sevenths of the total amount consumed in the United States; and only one-half of the consumption of Class I and II fiber, i. e., wools habitually used in the manufacture of clothing.

Slackened mill demand and smaller imports of wool in 1920 were merely part of a general return to normal after the period of abnormal demand and supply. However, civilian needs for garments made of wool were very inadequately met during the war. Thus there was a large potential market for woolen goods, which promised to absorb unusual supplies for several years to come. But prices had risen to such a point by 1920 that a large part of the consumers refused to buy. This "consumers' strike" was attracting some attention well before the middle of 1920, and, through its cumulative effect, was an important factor in causing the wool market to become moribund almost overnight.[8] Until then the mill consumption had been practically as large as at any time during the war, but beginning in June, 1920, mill consumption and imports rapidly declined. The mills went on part time or in some cases temporarily ceased operations; any wool which they purchased was merely to supplement existing stocks in order to fill current orders; wool consumption averaged considerably below pre-war normal during the last half of the year and during the early months of 1921. However, the heavy consumption of the first 6 months of 1920 resulted in a total annual consumption considerably above the pre-war average for the calendar year 1920. In the early spring of 1921 a steady resumption of mill activity, after prices were lowered to more reasonable levels, resulted in a total mill consumption for that year which was far above pre-war normal.[9]

The collapse of the domestic wool market late in May, 1920, was believed at first to be only a temporary phenomenon. But domestic wools continued almost unsalable until after the end of the year, and the lamb market also was in bad shape and getting worse, so that the woolgrowers became seriously alarmed. Bankers with heavy loans on sheep and wool were equally alarmed. The situation was especially bad in that the sheepmen had been unable to make provision for winter feed and the bankers were able to give little or no additional help.

World wool prices were almost continually on the down grade throughout the winter of 1920–21. Anticipation of the passage of

[8] See report of U. S. Tariff Commission, on the Wool-Growing Industry, 1921, pp. 14, 15.

[9] Total consumption for the calendar years 1918 and following were 742,000,000, 627,000,000, 379,000,000 and 650,000,000, respectively, of grease, wool and grease equivalent of scoured and pulled wool. The pre-war normal, figured on the same basis, amounted to about 525,000,000 pounds a year.

he emergency tariff, combined with a market "in buyers' favor," as an incentive for importers to stock up with wool. Accordingly, nports of Class I and Class II wools, i. e., clothing wools, during the rst five months of 1921 amounted to nearly 200,000,000 pounds, hile, in addition, the equivalent of approximately 30,000,000 ounds of grease wool was imported in the form of tops. After lay 28, owing to the fact that under the emergency tariff a double uty was levied on grease wool altered in any way from the condition s shorn from the sheep, skirted wools could only be imported under a 0 cent duty per grease pound. Therefore imports of Class I and Class I wools, i. e., clothing wools, practically ceased after June 1. Occaional small arrivals were stored in bond for subsequent removal. Only carpet wools, unaffected by the emergency tariff, continued to nter freely. However, the 200,000,000 pounds of Class I and Class II ools imported in the five months prior to June 1, 1921, were twice he average annual importations during the 12 years ending in 915, and two-thirds of the average annual importations of similar ools during the period of super activity following June 30, 1915. Table 14 shows total imports of wools, by classes and by months, luring 1921.

TABLE 14.—*Total imports of wool, by classes, 1921.*

Month.	Class I.	Class II.	Mohair, Alpaca, etc.	Class III.	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
anuary	15,993,109	1,858,574	51,491	3,266,306	21,169,480
ebruary	36,209,958	1,387,360	153,494	5,135,156	42,885,968
March	80,794,265	3,862,496	1,670,576	11,775,761	98,103,098
April	52,387,414	2,637,019	316,331	9,995,477	65,336,241
May	10,123,845	245,804	209,129	4,165,820	14,744,598
June	868,215	28,365	412,870	4,642,305	5,951,755
July	656,111	80,008	.....	8,660,745	9,396,864
August	3,947,376	.....	75,059	11,844,309	15,866,744
September	293,857	24,114	139,108	14,135,380	14,592,459
October	585,369	.....	606,647	7,893,690	9,085,706
November	2,727,225	373,737	353,139	7,492,294	10,946,395
December	3,592,480	273,754	72,975	8,580,644	12,519,853
Total	208,179,224	10,771,231	4,060,819	97,587,887	320,599,161

These heavy imports during the first five months of 1921 merely added to the stocks on hand, and in view of the accelerating mill consumption, which with normal stocks would have reacted quickly on wool prices, they evidently were a large factor in preventing a rise in the price of wool until several months after the emergency tariff became law. In fact, there was a slight drop in quotations for most grades after June 1, partly because earlier market quotations frequently were only nominal. Then, too, there was a large carryover of domestic wools of the 1920 clip, previously virtually unsalable. Usually only the most desirable of the 1920 domestic wools were bid for prior to June 1, and the bulk of the large carryover consisted of wools somewhat less desirable than those of the 1921 clip. These 1920 wools were disposed of after June 1, with some effect on average prices.

However, as domestic and imported stocks became depleted, especially stocks of fine wools, domestic prices began to move upward. Medium and coarser wools already in stock also began to be more sought after, partly because of the very high duty to which foreign fine wools were subjected. The prices of most grades of

domestic wools began to increase after about the first week in Nove ber. This upward movement continued steadily until about July 1922, despite the fact that world wool prices fell sharply after t last of October and did not regain the October level until the fi week in February. In other words, while the world market w declining from October levels the domestic market was rising, as result of short supplies and no chance for immediate relief exce at the expense of a very high duty.

Tables 15 and 16 show the course of quoted prices for domes wools during 1920 and 1921, and the course of prices at the Lond wool auctions during the greater part of 1921. As previously note the improvement in domestic prices began in November for near all grades. The relative stability of the domestic market during t summer months, as contrasted with the erratic English mark shows the effect of some steadying influence in this country aft June 1, quite apart from the fact that domestic prices later rose the same time that a decline occurred in world prices. Table 1 which shows the trend of prices on the London market since 190 is added for its general interest.

TABLE 15.—*Wholesale price per pound of domestic wool, Boston.*[1]

Grade.	1920				1921				1922		
	Jan.	Apr.	July.	Oct.	Jan.	Apr.	July.	Oct.	Jan.	Apr.	Ju
Territory (scoured):											
Fine staple	$2.00	$2.10	$1.70	$1.375	$0.825	$0.90	$0.83	$0.83	$0.91	$1.075	$1.
Half-blood	1.825	1.90	1.50	1.225	.675	.725	.70	.70	.795	.975	1.
Three-eighths blood	1.35	1.30	1.025	.875	.525	.540	.51	.525	.60	.750	
Quarter-blood	1.125	1.15	.875	.675	.425	.435	.40	.40	.515	.635	
Common and braid	.725	.625	.55	.55	.19	.19	.215	.215	.315	.419	
Fine clothing	1.725	1.80	1.50	1.225							
Fine medium clothing	1.625	1.70	1.475	1.025							
Fine and fine medium clothing					.575	.675	.615	.625	.72	.900	1.
Ohio and Pennsylvania (grease):											
Delaine	.93	.985	.71	.625	.465	.39	.355	.345	.405	.465	
Half-blood	.85	.84	.69	.575	.34	.33	.30	.295	.365	.400	
Three-eighths blood	.70	.695	.54	.44	.275	.295	.265	.265	.34	.375	
Quarter blood	.66	.665	.49	.405	.255	.28	.255	.242	.315	.365	
Common and braid	.415	.29	.29	.29	.135	.145	.16	.155	.195	.230	
Fine clothing	.71	.75	.61	.545	.305	.325	.275	.285	.335	.375	
Half-blood clothing					.255	.255	.255	.245	.295	.330	
Three-eighths and one-fourth blood clothing					.235	.235	.235	.215	.255	.300	
One-half, three-eighths, and one-fourth blood clothing	.61	.64	.532	.475	.245	.245	.245	.23	[2] .275		
Michigan and New York (grease):											
Delaine	.885	.995	.68	.60	.445	.37	.32	.32	.385	.435	
Half-blood	.81	.81	.675	.55	.33	.315	.29	.285	.345	.375	
Three-eighths blood	.685	.675	.535		.295	.285	.26	.25	.325	.323	
Quarter-blood	.66	.65	.49	.405	.245	.27	.25	.237	.315	.360	
Common and braid	.415	.29	.29	.29	.135	.135	.16	.155	.195	.230	
Fine clothing	.675	.715	.59	.51	.295	.305	.285	.295	.295	.345	
Half-blood clothing									.265	.330	
Three-eighths and one-fourth blood clothing									.235	.275	
One-half, three-eighths, and one-fourth blood clothing	.56	.55	.50	.40	.25	.24	.24	.22	[2] .25		

[1] From the Commercial Bulletin, Boston, for date nearest to first day in specified months. Territ *prices* are per scoured pound. Other wools are quoted per grease pound.

[2] *Averaged from* half-blood and three-eighths and one-fourth blood clothing.

TABLE 16.—*Wool values at the London sales.*[1]

[Pence per clean pound.]

FIRST COST, WITHOUT OIL, LONDON, 1921-22.

ly, 4.	Description.	Mar. 5.	Apr. 15.	May 12.	June 18.	July 28.	Sept. 15.	Oct. 15.	Oct. 29.
	COMBING.								
32	70's super fleeces	51	40	42	47	40	48	53	53
30½	64/67's good medium fleeces	39	33	36	39	35	40	45	47
30	60/64's good medium fleeces	30	26	30	33	29	35	39	42
28	64's good pieces	33	29	34½	37	32	38	41	43
27	60's good pieces	24	23	27	30	26	31	34	36
29	58/60's good medium fleeces	30	29	30	29	27	32	34	36
26	56's fine crossbred fleeces	24	22	24	23	21	25	24	24
23½	50/56's fine crossbred fleeces	17	15	18	17	15	20	22	22
18	46/50's crossbred fleeces	14	13	15	14	12	14	15	15
17	46's crossbred fleeces	[2] 12	10	13	12	[3] 10	12	12	12
16	44's crossbred fleeces	([2])	([2])	11	11	9	10	[2] 10	10
15½	36/40's crossbred fleeces	([2])	([2])	9	9	7	8	[2] 8	8
	CAPES.								
27	10/12 months	32½	[2] 32	.....	33	28½	36	37	.....
24	6/7 months	22	[2] 22	.....	26	.....	.....	.....	.....
	CARBONIZING.								
26	60/64's good pieces	23	21	26	30	28	30	33	34
25	60/64's pieces and bellies	19	18	24	28	25	28	30	32
20	60's average locks	14	12	18	22	20	23	[2] 24	24
	64's average lambs	25	18	20	24	22	25	[2] 27	27

aly, 914.	Description.	Nov. 25.	Dec. 8.	Jan. 12.	Feb. 2.	Mar. 10.	May 8.	May 19.	June 6.
	COMBING.								
32	70's super fleeces	46½	47½	53½	53	57½	59½	60	[3] 57
30½	64/67's good medium fleeces	41½	42	46½	47	46½	51	52	50
30	60/64's good medium fleeces	36	36	42	41	41	45	46	44
28	64's good pieces	35	36	43	43	40	45	45	45
27	60's good pieces	32	32	36	37	37	41	42	41
29	58/60's good medium fleeces	31	31	36	37	37	40	40	39
26	56's fine crossbred fleeces	22	23	26	26	25	30	28	26
24½	50/56's fine crossbred fleeces	20	20	22	22	22	27	26	21
18	46/50's crossbred fleeces	14	15	17	16	17	19	18	14
17	46's crossbred fleeces	11	12	13	12	13	15	15	11
16	44's crossbred fleeces	9	10	12	10	11	13	13	10
15½	36/40's crossbred fleeces	.....	8-9	10	9	9	12	11	9
	CAPES.								
27	10/12 months	.....	[2] 35	.....	37	39	43	43	42
24	6/7 months	.....	[2] 24	.....	30	30	34	35	31
	CARBONIZING.								
26	60/64's good pieces	29	30	33	34	33	38	39	39
25	60/64's pieces and bellies	27	28	30	30	30	33	35	35
20	60's average locks	20	23	25	26	25	26½	28	27
	64's average lambs	24	26	31	30	31	31	32	28

[1] From the Wool Record and Textile World, Bradford, England.
[2] Nominal.
[3] Unsalable.

TABLE 17.—*Trend of wool prices, London, 1900 to 1921.*[1]

[Pence per clean pound.]

Date.	Merinos.			Crossbred.				
					Australian.			
	Port Phillip, good.	Adelaide, average.	Cape, short, washing.	Buenos Aires, average.	Fine super.	Fine.	Medium.	Co
December, 1900	19½	17	14½	13½	15	12½	11½	
December, 1901	21	18½	15½	14	16	11	8	
December, 1910	27½	25	22	20½	23	19½	16½	
December, 1911	26½	24	20½	19	22	18	15	
December, 1912	29	26	22½	20½	24	20	17	
December, 1913	28½	25	22½	21	22½	18½	15½	
July, 1914	[2] 33½	28	27½	23½	26	22½	17	
December, 1915	43	35	31	26	37	34	28	
December, 1916	65	57	48	39	51	47	35	
April, 1917 [2]	75	63	50	38	[3] 54½	[3] 50½	[3] 35	
December, 1919	138	108	97	68	95	70	40	
December, 1920	65	40	34	28	45	30	19	
December, 1921	45	33	30	23	35	21	10½	

[1] From Schwarte and Buchanan, London.
[2] April, 1919, close of London public auctions.
[3] Nominal. As against July, 1914. Merinos, about 30 per cent higher; pieces, 15 per cent higher; me and coarse shreds, 40 per cent lower.

FRESH PORK, AND PREPARED AND PRESERVED MEATS.

The act of 1909 levied a duty of 1½ cents per pound on fresh po 4 cents per pound on bacon and hams, and 25 per cent ad valor on meats of all kinds, prepared or preserved. Bologna sausage v placed on the free list. The act of 1913 placed fresh pork and bac and hams on the free list, also meats of all kinds, prepared or p served. The emergency tariff placed a duty of 2 cents per pound fresh pork and 25 per cent ad valorem on meats of all kinds, prepar or preserved, not specially provided for in the act. The lat included bacon and hams and miscellaneous meats.

Of the above, the export trade of the United States deals primari with bacon and hams, of which this country is by far the leadi exporter. Relatively small amounts of fresh and of pickled po are sent abroad, but aside from canned, pickled, and other cured be exports of other meats, prepared or preserved, are quite sma With the exception of pork and pork products, these other mea really are special products which meet a more or less specializ demand. Imports of all the above are of only secondary importan when compared with exports. Table 18 shows exports and impor of these products for the calendar years 1919 to 1921, inclusive.

TABLE 18.—*Imports and exports of fresh pork and of prepared and preserved meats, calendar years 1919–1921.*

Item.	1919	1920	1921
EXPORTS.			
	Pounds.	*Pounds.*	*Pounds.*
Canned beef	53,867,000	23,766,000	6,077,000
Pickled and other cured	42,805,000	25,771,000	24,571,000
Total	96,672,000	49,537,000	30,648,000
Bacon	1,190,297,000	636,676,000	415,300,000
Hams and shoulders	596,790,000	185,247,000	232,380,000
Canned pork	5,792,000	1,802,000	1,150,000
Fresh pork	26,777,000	38,305,000	56,083,000
Pickled pork	34,114,000	38,709,000	32,850,000
Total	1,853,776,000	900,739,000	737,763,000
Sausage (total)	22,088,000	17,667,000	8,908,000
Grand total	1,972,536,000	967,943,000	777,319,000
IMPORTS.			
Fresh pork	2,779,000	1,541,000	816,000
Prepared and preserved meats	23,908,000	8,111,000	3,362,000
Total	26,687,000	9,652,000	4,178,000

It will be noted that in 1919 nearly 2,000,000,000 pounds of these meat products were exported, of which 94 per cent consisted of bacon, hams, and other pig meat. In 1920 these exports fell to slightly less than a billion pounds, and in 1921 to slightly less than 800,000,000, with the meat of the hog contributing 92 per cent and 94 per cent of the total. The decline from the wartime peak was a logical result of curtailed production after the war emergency was over, combined with depreciated foreign exchange and its effect on the purchase of American products. The peak of exports in 1919 represents an increase from nearly 450,000,000 pounds of these products in the year ending June 30, 1914, when 91 per cent of the total consisted of pig meat. It will also be noted that imports for 1919 to 1921, inclusive, averaged only 1 per cent of exports. In other words, imports were of only negligible importance compared with exports, which represented 8 per cent of total domestic production of fresh meats during the three years noted, though less than 4 per cent in 1914.

Since imports of these meats have averaged only 1 per cent of the exports, but the latter are of large volume, it would seem that there is no tariff problem in these commodities, and that imports are virtually an incident in the foreign trade of the United States. This is particularly true of imports of miscellaneous canned, cured, and other preserved meats, including sausage, but excluding products of the hog. They have amounted to less than one-sixth of the exports of similar meats, but the latter have formed only about 1 per cent of total production from domestic slaughter.

Since over 90 per cent of the exports consist of hog products (exclusive of lard), and the United States dominates world trade in hog products, it would seem even more difficult to find a direct tariff problem therein. During the three years ending December 31, 1921,

the total annual hog slaughter averaged 63,163,000 head in the United States, giving an average of 8,534,000,000 pounds of pork and 2,069,000,000 pounds of lard. Of these totals, 5,356,000,000 pounds of pork and 1,346,000,000 pounds of lard were produced under Federal inspection.[10] Of the total pork produced (exclusive of lard) 14 per cent was exported during these years. With so large an export of hog products, the emergency tariff could not be expected to affect domestic markets, since the United States has always been on an export basis, and domestic prices are profoundly influenced by world prices.

Tables 19 and 20 show imports and exports of hogs during the last calendar years, and contrasts this movement with the total number slaughtered in the United States, also with total dressed weight of the domestic slaughterings, excluding lard.

TABLE 19.—*Imports of swine compared with number slaughtered in the United States 1918–1921.*

(Free.)

Imported from—	Calendar year.							
	1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Canada	7,454	$184,595	20,584	$756,650	881	$19,664	2,692	$63,407
United Kingdom	5	933	5	1,022	1	214	.....	.....
Japan	5	54	.....	.....	.....	.....	.....	.....
Mexico	1	15	.....	.....	136	2,435	122	1,437
Virgin Islands	.....	.....	68	587	78	555	24	205
All other countries	2	20	.....	.....	.....	.....	.....	.....
Total	7,467	185,617	20,657	758,259	1,096	22,868	2,838	65,049
Number of hogs slaughtered in the United States	65,732,450		66,680,330		60,635,884		62,172,853	
Pork produced (pounds)	8,854,000,000		8,933,000,000		8,193,000,000		8,475,000,000	

TABLE 20.—*Exports of swine, 1918–1921.*

Exported to—	Calendar year.							
	1918		1919		1920		1921	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Cuba	9,583	$276,475	19,947	$521,035	49,021	$1,494,739	98,015	$1,338,169
Mexico	132	4,062	3,987	85,302	5,237	135,009	24,217	409,328
Canada	134	5,127	177	12,833	151	9,848	522	18,821
Philippine Islands	8	620	55	5,500	41	3,515	123	9,799
Brazil	339	39,595	221	19,315	325	43,424	106	20,309
Chile	16	1,375	4	140	5	775	7	2,083
Argentina	14	1,400	246	35,015	20	2,520	6	1,200
Panama	19	1,240	.....	.....	.....	.....	.....	.....
Uruguay	15	1,460	.....	.....	51	15,300	.....	.....
Nicaragua	14	425	13	679	.....	.....	.....	.....
United Kingdom	.....	.....	.....	.....	178	6,230	.....	.....
All other countries	34	1,950	95	4,002	221	12,424	71	3,650
Total	10,308	333,729	24,745	683,911	55,250	1,723,784	123,067	1,803,341

[10] U. S. Dept. of Agr., Bu. of Animal Industry, Meat Production, etc., 1921.

UNITED STATES TARIFF COMMISSION
WASHINGTON

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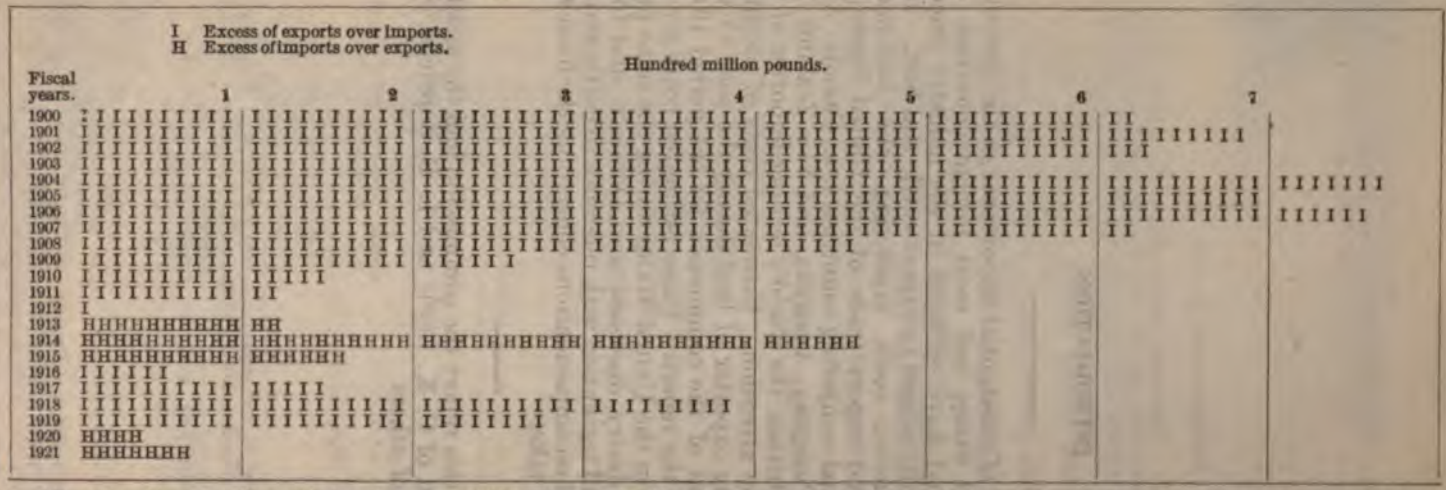
INTRODUCTION.

The cattle industry is of substantial importance in the agricultural economy of the United States and most foreign countries. This report notes changes that have occurred in the industry since the United States has virtually ceased to export cattle and beef. It discusses domestic production costs, marketing, the beef-packing industry, the import and export trade of the United States, and production in the principal competing countries, i. e., Canada, Argentina, Uruguay, Brazil, Paraguay, Australia, and New Zealand. The import trade of Great Britain, the world's leading importer of foodstuffs, also receives some attention. Estimated costs of production in Argentina, the leading exporter of beef during the past 15 years, were secured by an agent of the commission for the period 1919–20 and are incorporated in the report. These estimated costs are compared with similar costs in the United States during the same period. Other phases of the industry discussed are: Domestic and foreign prices, the history of tariff legislation with reference to cattle and beef, tariff considerations, and recommendations concerning the form which a duty, if levied, should take.

In the preparation of this report the commission had the assistance of Dr. L. G. Connor and of C. K. Lewis and L. B. Zapoleon, of the commission's staff, and of others.

FIGURE 1.—*Net imports and exports of beef, 1900–1921.*

(Including live cattle converted into their beef equivalent.) [1]



[1] Exports and imports of live cattle have been converted into the pounds of beef they represent according to the following scale: Exports, 1900–1914, 600 pounds per head; 1915–1920, 450 pounds per head. Imports, 1900–1914, 375 pounds per head; 1915–1920, 450 pounds per head.

CATTLE AND BEEF.

SUMMARY.

Decline in beef surplus of the United States.—During the last 20 years the United States has been steadily losing its position as a heavy exporter of certain staple food products. This is particularly true of cattle and beef. In these products this country virtually dominated the world export trade until about 1907; by 1914 trade had shifted to a heavy import basis. Tempórarily the World War halted this drift, but by 1920 the United States showed a balance of imports. Figure 1, page vi, is a graphic portrayal of these changes in our foreign trade in beef and live cattle. In connection with this graph it should be noted that because of the proximity of Canadian and Mexican supplies, and also the varied trade in different kinds of cattle and beef, the United States has throughout maintained both an export and an import trade. Even when the country was upon an import basis, it had an appreciable export trade in canned and pickled or cured beef as well as in breeding cattle, and to some extent in butcher cattle. Although large amounts of dressed beef entered in 1914 and 1915, imports have consisted chiefly of live cattle, mainly of thin animals to be fattened in this country.

Reasons for loss of beef surplus.—The decline of beef production and in the export trade in beef products may be accounted for by (1) the rapid increase in population, (2) greater competition between cattle and grain production, (3) homesteading and curtailment of free ranges, (4) increased competition between beef and dairy production, and (5) the indirect effect of competition between domestic and foreign beef in the world markets. Thus the population of the United States gained nearly 40 per cent between 1900 and 1920 and about 32 per cent between 1900 and 1915; this increase was the dominant factor in the decline in beef production and export. The augmented population had to be fed; cereal foods are cheaper than meats, and on tillable land in humid areas more food value per acre can be produced in the form of cereals than in the form of beef. Then, too, there were periods of industrial depression between 1900 and 1914 which adversely affected domestic demand for meats at the same time that extensions in cereal production were curtailing cattle herds in the farming regions. Thus per capita consumption of beef and veal averaged 86.8 pounds in 1907 and only 63.3 pounds in 1914. Moreover, the increase in population accelerated settlement in the region west of the one-hundredth meridian, and homesteading greatly curtailed the area of free range: the area of unappropriated and unreserved lands decreased from 917,135,000 acres in 1900 to 290,759,000 in 1914. To a large degree, the settlers neglected live stock in

favor of grain, and the cutting up of the better range areas greatly curtailed the value of the remaining lands to the cattlemen. Serious inroads were thus made on the herds which supplied the bulk of the feeder cattle normally finished on grain in the Corn Belt.

This curtailment of free range was one of the most potent factors in diminishing the production of beef. It not only increased costs to range cattlemen and decreased the supply of cattle but, by reducing the supply faster than the demand subsided, resulted in higher prices to cattle feeders for thin animals needed to consume surpluses of grain and roughage. The "feeding margin"—i. e., the spread between the price paid for thin animals and the price received for them when sold for butchering—was thus narrowed and the feeders' margin of profit made more uncertain. The cattle feeders' difficulties were further augmented by the marked variations in the steadily rising cost of feed resulting from abnormal seasons when feed supplies were reduced. Abnormal seasons appear to have been an important factor in the sudden increase in imports in 1914. Furthermore, a steady increase of urban population sharpened competition between beef and dairy cattle. The latter increased with the extension of market milk zones to supply the cities, and longer shipments of market milk caused a change to dairying in still more remote areas to meet the growing needs of butter and cheese factories. These changes were made at the expense of purely beef herds, though a considerable part of the gain in dairy production appears to have resulted from an increase of dual-purpose herds in more or less remote areas, herds wherein calves raised for beef are often almost as important as sales of milk or cream. For the foregoing reason, domestic production declined, absolutely as well as in proportion to population, although prices were rising both at home and abroad.

Competition of domestic with foreign beef in the world market was an additional factor in the domestic decline, but was effective only indirectly. The decrease in American production paralleled a world tendency toward a decrease relative to population,[1] which was partly lessened by a slow development in the marketing of earlier maturing beeves. As cattle were ready for slaughter a year or more earlier the output of meat was greatly increased, particularly in Argentina, whose beef largely replaced that of the United States on the European market as the American surplus declined.[2] But the price of beef tended slowly upward, and the increased price rather discouraged consumption. Had other exporting countries, especially Argentina, not increased their exports, prices in the world market undoubtedly would have risen even more; to what extent production in the United States would have been stimulated is a matter of conjecture. It is significant, however, that production of beef and veal in the slaughtering plants of the United States declined 1,873,000,000 pounds, or 24 per cent, between 1907 and 1914, inclusive, while domestic consumption declined 1,351,000,000 pounds, or 17 per cent.[3] In other words, 72 per cent of the decline in domestic production during this period, which marks the transition from a heavy export to a net import basis, was offset by decreased domestic consumption. It is apparent, therefore, that the decline in American production was due primarily to readjustments in the

[1] See Report 109, Office of the Secretary, U. S. Department of Agriculture, pp. 192 ff., 216 ff.
[2] See p. 57.
[3] See Table 2, p. 7.

agricultural activities of the United States necessitated largely by increases in population, and to decreased domestic demand as the price of beef increased. It was only indirectly affected by foreign competition.

TABLE 1.—*Summary.*

	Number of cattle and calves slaughtered.	Weight of dressed beef and veal produced.[1]	Fresh beef and veal exported.		Canned and other beef and beef products exported.		Live cattle exported.	
			Quantity.	Value.	Quantity.	Value.	Number.	Value.
Fiscal year:		*Millions of pounds.*	*Thousands of pounds.*		*Thousands of pounds.*			
1906	.....	.....	268,054	$24,310,038	453,036	$33,397,252	584,239	$42,081,170
1907	19,496,700	7,946	281,652	26,367,287	402,703	29,466,597	423,051	34,577,392
1908	18,674,900	7,281	201,154	20,339,377	375,211	30,465,520	349,210	29,339,134
1909	20,127,398	7,755	122,953	12,698,594	293,003	27,245,296	207,542	18,046,976
1910	20,093,200	8,010	75,730	7,733,751	207,148	20,546,848	139,430	12,200,154
1911	19,222,600	7,603	42,511	4,478,401	219,618	20,348,601	150,100	13,163,920
1912	18,327,000	7,177	15,264	1,596,319	215,033	19,957,577	105,506	8,870,075
1913	16,762,100	6,401	7,362	902,149	159,878	16,447,859	24,714	1,177,199
1914	15,665,900	6,072	6,394	788,793	142,285	14,144,214	18,376	647,288
1915	15,461,600	6,244	170,441	21,731,633	219,298	27,167,498	5,484	702,847
1916	17,800,600	6,654	231,214	28,885,999	220,915	28,730,509	21,287	2,378,248
1917	20,754,600	7,348	197,177	26,277,271	220,846	37,338,634	13,387	949,503
1918	.....	.....	370,033	67,383,426	223,790	53,003,276	18,213	1,247,800
Calendar year:								
1918	23,517,600	8,111	514,342	109,605,363	269,542	77,949,788	17,280	1,082,758
1919	22,676,100	7,143	174,427	40,280,747	232,066	61,978,708	69,859	6,439,521
1920	22,071,100	7,399	89,649	17,564,887	162,110	32,472,988	85,302	10,752,525
1921	20,925,900	7,058	10,341	1,798,398	205,140	22,758,867	196,533	11,740,570

[1] Calendar years.

IMPORTS FOR CONSUMPTION.

	Fresh beef and veal.			Canned and other beef and beef products.			Live cattle.		
	Quantity.	Value.	Duty collected.	Quantity.	Value.	Duty collected.	Number.	Value.	Duty collected.
Fiscal year:	*Pounds.*			*Pounds.*					
1906	302,717	$31,709	$6,054	3,447,254	$519,436	$66,538	27,481	$405,928	$107,865
1907	85,118	8,828	1,188	2,165,536	476,472	65,890	30,638	429,138	112,475
1908	264,773	33,317	4,870	2,202,816	351,570	45,577	89,082	1,346,454	364,750
1909	200,617	20,977	3,574	5,110,967	702,220	114,363	137,078	1,853,580	499,277
1910	949,084	63,664	13,185	10,916,693	1,325,194	47,391	193,631	2,700,170	726,709
1911	381,809	23,197	5,725	7,770,768	1,109,190	63,250	180,463	2,587,972	702,338
1912	1,023,097	78,559	15,346	6,437,412	863,487	59,890	316,002	4,486,305	1,214,481
1913	4,228,764	322,567	60,544	10,890,156	1,314,977	44,023	423,813	6,318,467	1,764,659
1914	178,387,307	15,273,447	55,949	12,524,715	2,315,406	28,105	871,553	18,666,386	568,686
1915	184,519,708	16,943,663	.....	15,591,021	3,025,133	9,952	539,361	17,546,085	.....
1916	70,892,487	7,107,638	.....	5,815,729	1,381,416	7,870	447,152	15,342,135	.....
1917	15,221,229	1,613,102	.....	32,345,691	4,273,700	9,410	373,686	13,021,259	.....
1918	25,699,415	3,683,772	.....	104,768,408	22,414,040	141	294,207	17,801,579	.....
Calendar year:									
1918	23,441,075	4,173,445	.....	53,453,634	14,545,024	560	353,189	25,170,588	.....
1919	38,461,756	6,408,081	.....	37,752,412	7,415,541	1,850	642,395	53,296,078	.....
1920	50,182,105	8,057,270	.....	25,403,906	3,369,837	6,386	379,114	27,418,604	.....
1921	32,377,922	3,944,728	382,228	5,981,507	406,707	19,102	194,869	6,117,439	673,482

The Tariff Problem in Cattle and Beef.

Tariff Act of October 3, 1913.

Paragraph 545. Meats: Fresh beef, veal, * * * (free).
Paragraph 619. Cattle * * * (free).

Prior to 1910, exports of beef and cattle formed a sufficiently large percentage of domestic production to enable the world market largely to control the domestic price level. The duties in force could not have been effective to any appreciable extent. After about 1910, exports were so small that they may be considered somewhat in the nature of "bargain" purchases on the live-stock markets. The duties in force probably exerted some indirect, though slight, effect by limiting imports of cattle; the production and export of beef were thus curtailed and the effect of the world market on domestic prices minimized. But the fact that the United States went on an import basis in 1913 indicates that a duty on cattle and beef then would have been effective. It should be noted, however, that because of the interchangeability of beef and pork, and the fact that the United States has always exported large amounts of pork and pork products, no duty on cattle and beef can be 100 per cent effective while these heavy exports continue.[4]

During the war years, particularly after 1916, the scarcity of shipping placed a premium on North American beef supplies. Three to six times as much beef could be sent to Europe within a given time as from Argentina or Australasia. Domestic prices therefore rose greatly, and production increased rapidly. At the same time, free entry for Canadian and Mexican cattle, chiefly stockers and feeders, further added to domestic production, partly through the large gains in weight made by such cattle in American pastures and feed lots. The tariff problem in beef and cattle was forgotten, since, quite apart from the temporary return of the United States to an export basis; the market of these years was virtually a seller's market. However, with the end of hostilities, rapid price declines, and liquidation of war-time increases in the cattle herds, the tariff problem again came to the front. With the return of the United States to an import basis, in 1920, a duty, if imposed, would naturally be effective in the interest of the domestic producer. This occurred under the emergency tariff act.[5]

FORM OF IMPORTS AND EXPORTS.

There are three forms in which beef may enter or leave the United States: (1) Stocker and feeder cattle, (2) fat cattle; and (3) dressed beef. Exports from the United States have been almost exclusively in the form of dressed beef and fat cattle. Imports have been largely in the form of live cattle from Canada and Mexico; two-thirds of the Canadian cattle, other than calves, have been stockers and feeders to be fattened in this country. Shipping costs eliminate other countries from such trade with the United States. The enormous corn crop in this country and the virtual absence of such grain in contiguous countries accounts for the preponderance of thin cattle in our imports.

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[4] See p. 3.
[5] See report of the U. S. Tariff Commission, The Emergency Tariff and its effect on Cattle, Beef, etc., 1922.

Imports of feeder and stocker cattle compete with similar domestic animals, and indirectly with domestic fat animals, since thin animals fattened after this importation make a considerable addition to the supply of domestic beef. Such importations have a tendency to cheapen prices for similar domestic cattle and to widen the "feeding margin."[3] The result is to encourage more extensive feeding operations, which in turn tends to narrow the margin, and, by increasing the demand for and price of feedstuffs, further to nullify the advantage of the slightly wider spread. There is thus a ready adjustment between supply and demand and a neutralization of disadvantages as between producers of different classes of cattle in the United States. Owing to the size and geographical extent of the corn and hay crops in the United States, there is an advantage to domestic producers of feedstuffs through the entry of feeder and stocker cattle. The hides and other by-products derived from slaughter of these animals help to offset the decreasing domestic supplies of these commodities, particularly of hides.

Imports of fat cattle, which have come chiefly from Canada, compete directly with similar domestic animals, and indirectly with domestic stockers and feeders, since the larger the imports of butcher animals, the less the demand for thin stock to be fattened for beef. Growers of corn and other feedstuffs also are adversely affected, since the demand for their products is curtailed. As between fat and thin animals, the importation of the latter would therefore seem preferable from the farmer's point of view.

Imports of beef have come mainly from Argentina, Canada, and Australasia. They have been practically negligible in amount because of the surplus of Canadian feeders available for fattening on American corn. Such imports compete with domestic producers in exactly the same manner as imports of fat cattle; they seem also to be somewhat to the disadvantage of the highly specialized and highly efficient slaughtering industry, which depends on maximum output to maintain narrow margins between first cost of fat cattle and wholesale prices to distributors of their products.

EFFECT OF THE TARIFF ON FORM OF IMPORTS.

From the foregoing, it is evident that duties upon imports of cattle and beef must be levied with reference to the different grades of cattle and with due consideration to the relation between cattle and dressed beef, or they may markedly affect the form in which beef may be imported. Should the duty bear more lightly upon imports of beef, the slaughtering industry in Canada and elsewhere would be favored at the expense of that in the United States, while domestic producers of both fat and feeder cattle would be discriminated against, and cattle feeding in exporting countries would be stimulated. The reverse would be true if the duties were framed to favor the importation of live cattle, particularly stockers and feeders. If duties were placed upon hides and other by-products, the balance between the levy on live cattle as compared with beef would also be affected.

[3] Margin per 100 pounds between price paid for thin cattle and price received for fat cattle.

METHOD OF LEVYING DUTIES.

An ad valorem duty on live animals would take care of the varying grades and values of cattle and, since the price of cattle bears a close relation to that of dressed beef, would adjust the duties with approximate justice between these two forms of imports. There are, however, serious objections to an ad valorem duty, particularly on agricultural products.

A specific duty per pound on dressed beef and on live cattle is not open to the fundamental objections to an ad valorem duty, and is readily adjusted as between fat cattle and beef. Thin cattle, however, are worth much less per pound than fat cattle, and a flat specific rate that would be fair on fat cattle would discriminate against stockers and feeders. Moreover, a rate which would adjust the duty on thin cattle to that on beef would still discriminate against stockers and feeders, because such a rate would be too low on fat cattle. A graduated specific duty on live cattle, adjusted to a specific duty on beef, would correct this difficulty, and could be made to approximate an ad valorem duty in flexibility and justice to different classes of cattle.

It has been proposed to base such a graduation on age, but age, while roughly correlated to weight and quality, is not a good measure of variations in quality, and no delimitation according to age can adequately differentiate between thin and fat cattle. Thus the age of stocker and feeder cattle imported from Canada ranges from about 18 to 36 months, and of fat cattle from about 30 to 42 months. A rate on cattle less than 2 years of age and a higher rate on older cattle would tax most Canadian feeders at the same rate per pound as fat cattle. On the other hand, a graduation according to weight will readily differentiate between fat and thin cattle likely to be imported from Canada or Mexico for a number of years to come, since, broadly speaking, differences in weight are chiefly responsible for variations in quality and value per pound of imported cattle.

As an illustration of the difference in value per 100 pounds on the Chicago market from 1910 to 1916, inclusive, stockers and feeders averaged 26 per cent cheaper per 100 pounds than native beef steers. Stockers and feeders as a class, therefore, should be taxed at approximately 75 per cent of the rate applied to fat cattle. Stockers appear to have averaged about 15 per cent cheaper than feeders during recent years, and if a further division were to be made, feeders should be taxed at approximately 80 per cent of the rate on fat cattle, and stockers at 70 per cent. With reference to graduations according to weight, a fair dividing line between imported fat and thin cattle is 1,050 to 1,100 pounds. If a further division were made, feeders may properly be considered those which weigh from about 750 pounds to 1,099 pounds, fat cattle 1,100 pounds or over, and stockers those which weigh less than 750 pounds.

Since imports of live cattle, particularly stockers and feeders, are more desirable from the standpoint of the cattle industry than imports of dressed beef, duties which may be levied on hides and tallow might be largely or entirely neglected in adjusting the rate on beef to that on live cattle. Thus a duty of 2 cents per pound on fresh beef would be approximately paralleled by 1.1 cents per pound on fat cattle and 0.8 of a cent per pound on feeders and stockers, or 0.85

of a cent on feeders and 0.75 of a cent on stockers. With some allowance for a duty on hides, a duty of 3.5 cents on fresh beef would correspond to about 2 cents on fat cattle and 1.5 cents on stockers and feeders, or 1.6 cents on feeders and 1.4 cents on stockers. With no allowance for a duty on hides, a duty of 3.5 cents per pound on beef would correspond to a duty of 1.9 cents per pound on fat cattle and 1.4 cents on stockers and feeders, or 1.5 cents on feeders and 1.3 cents on stockers.

The Cattle Industry of the United States.

DAIRYING AND BEEF PRODUCTION.

The two great divisions of cattle raising in the United States are for the production of beef and of dairy products. These branches of the industry differ in respect to marketable products and in methods of management. Dairying is most important in the thickly populated regions north of the Potomac and Ohio Rivers and east of the Missouri River, with the centers of the industry conforming roughly to the chief centers of population. It is an intensive industry as compared with the extensive methods of beef raising, especially when the latter is carried on under range conditions. Dairying is beset with special problems which are unrelated to the production of beef, and which, therefore, will not be considered here.[8] The following table gives a statistical comparison of the two branches. Because of adjustments necessitated by changes in the dates when the several censuses were taken, the figures in Table 2 should be viewed only as rough approximations.

Table 2.—*Milch cows and other cattle (except calves)* [1] *in the United States, 1900–1920.*

[From Federal Census.]

	Total cattle (except calves).	Milch cows.	Other cattle (except calves).	
			Total.	Beef cows (cows other than "milch cows").
1900	52,407,000	17,136,000	35,271,000	11,559,000
1910	52,494,000	[1] 18,150,000	[1] 34,344,000	12,024,000
1920	51,275,000	19,672,000	31,603,000	12,644,000

[1] The census of 1910 includes dairy cows over 15½ months old; the censuses of 1900 and 1920 include 2-year-olds and over. To make the figures comparable, 2,473,000 animals have therefore been deducted from the number of dairy cows in 1910 and added to "other cattle." A further adjustment is necessitated by the fact that the census of 1900 was taken as of June 1, that of 1910 as of Apr. 15, and that of 1920 as of Jan. 1. From the "other cattle" in 1910 a deduction of one and one-half million has been made to allow for slaughter between Apr. 15 and June 1 to make the figures more nearly comparable with those for 1900. No deduction has been made from 1920 figures to allow for slaughter and loss between Jan. 1 and June 1, the requisite data therefor being lacking. The above adjustments are based largely on data supplied by the U. S. Department of Agriculture.

PERIOD OF TRANSITION IN THE BEEF INDUSTRY.

The raising of beef cattle was greatly stimulated by the opening of the West, by subsequent developments in transportation facilities, and the growth of the meat-packing industry. In 1870 the number

[8] See survey of U. S. Tariff Commission, Dairy Products, for a study of the conditions of production and foreign competition in these products.

of "cattle, other than calves and milch cows," was 13,566,005; in 1890, it was 33,734,128; and in 1900 the peak was reached with 35,271,000. During this period the number of milch cows increased much more slowly—from 8,935,332 in 1870 to 17,135,633 in 1900. Changes which occurred thereafter represented primarily readjustments to local conditions, except as more or less regional homesteading deprived cattlemen of range formerly used at will. In such parts of the great prairie sections as were adapted to crop production, ranching methods of cattle raising gave way to cereal production, and to some extent to a combination of crop husbandry with dairying or beef and pork production. These readjustments, however, left the relatively sparsely settled trans-Mississippi country as the beef surplus region of the United States. In general, the area east of the Mississippi constitutes the beef deficiency region and furnishes a market for the western surplus. Although population has increased during the past decade relatively faster in the West, the absolute increase east of the Mississippi has been twice as large. The beef-production status of the two regions has not been altered.

The mere existence, prior to 1914, of substantial protective tariffs upon beef and cattle, it should be noted, was no more of a factor in the development of the industry until 1900 than it was in the subsequent decline from 1907 to 1914; just as the removal of the tariff in 1914 was not the cause of the great increase in production and exports during the war. It by no means follows, however, that import duties will not be of much more substantial effect now that the United States is virtually a beef deficiency country. The beef industry of the United States, both on the range and in the farming States, has been undergoing a period of transition. It is largely the familiar transition which has occurred or is in progress in all the newer countries. The pastoral type of production is a frontier industry, and is steadily relegated to regions whose physical limitations, except locally, render crop production unprofitable. In the farming regions it gives way to wheat and other grains; and these in turn usually yield to mixed farming, wherein crop husbandry is combined with one or more forms of live stock production. Substantially the same changes are in progress in Canada, Argentina, and Australasia. The following outline of the tariff problems treats briefly of the conditions of domestic production on range and farm, the character and geographic distribution of the decline, and the possibilities of renewed expansion.

Between 1900 and 1920 the population of the United States increased more than 39 per cent. During the same period the number of dairy cows increased from 17,136,000 in 1900 to 19,672,000 in 1920, or 15 per cent. In beef cattle there appears to have been an absolute decline in numbers, from 35,271,000 in 1900 to 31,602,000 in 1920. However, this numerical decline really was less than the figures indicate. The earlier census was taken as of June 1 and the later one as of January 1. Between January and June several million cattle were butchered and many died; these losses, however, were more than offset by animals which were reported as calves in December, but which would be classed as yearlings in June. Had the census of 1920 been taken as of June 1 the number of beef cattle would probably have been almost as large as in 1910. As the number of beef cows ncreased slightly between 1900 and 1920, despite the apparent reduc-

tion in the total number of beef cattle, the probable decline, therefore, was in steers and surplus females and not in the breeding stock.

In connection with the reduction in the number of beef cattle during the census period 1910 and 1920, it should be remembered that this decline occurred between 1910 and 1914; subsequently the war caused a strong reaction. The census of January 1, 1920, therefore, records the numbers at the close of this war period. A better indication of the fluctuations in the beef supply is afforded by statistics of annual slaughter and production of beef and veal.

The decline in beef cattle after 1900 was accompanied not only by an expansion in specialized dairying but also by a further development of combined dairying and beef production in herds in which it often would be difficult to determine which phase was the more important. This development was especially pronounced west of the Allegheny Mountains. A partial abandonment of cattle breeding also took place in parts of the Middle and Central West, where producers frequently preferred to buy western cattle for fattening to raising young stock on their relatively high-priced land. Others changed from breeding to the grazing of purchased cattle, or sometimes to a combination of grazing and winter feeding. More recently, however, some producers have not been satisfied with the quality of purchased feeder animals and have again begun to breed and raise beef calves.

PRODUCTION AND CONSUMPTION OF BEEF SINCE 1907.

Strict comparison of the number of cattle, it has been seen, is not possible because of changes in classification and dates of the censuses. Fluctuations in supply are better indicated by the number of cattle slaughtered each year and the quantity of dressed beef and veal produced than by census figures for live animals. Table 3 is of special interest in this connection.

TABLE 3.—*Annual slaughter and the production and consumption of beef and veal, 1907–1921.*[1]

Calendar year.	Animals slaughtered.[2]		Production of—		Consumption of—		Per capita consumption of—	
	Beeves.	Calves.	Beef.	Veal.	Beef.[3]	Veal.	Beef.	Total beef and veal.
	Thousand head.	*Thousand head.*	*Million pounds.*	*Million pounds.*	*Million pounds.*	*Million pounds.*	*Pounds.*	*Pounds.*
1907	13,470	6,027	7,319	626	6,967	626	79.7	86.8
1908	12,845	5,830	6,676	605	6,448	605	72.4	79.2
1909	13,611	6,516	7,071	684	6,908	684	76.2	83.7
1910	13,541	6,553	6,733	687	6,623	687	71.8	79.2
1911	12,958	6,265	6,497	657	6,405	657	68.4	75.4
1912	11,979	6,348	5,920	668	5,864	668	61.7	68.7
1913	11,478	5,285	5,913	488	5,902	488	60.8	65.8
1914	11,005	4,661	5,639	433	5,797	438	58.9	63.3
1915	10,822	4,640	5,816	428	5,542	429	55.7	60.0
1916	12,027	5,774	6,118	536	5,854	537	58.1	63.4
1917	13,724	7,031	6,686	662	6,335	663	62.0	68.5
1918	15,750	7,767	7,320	791	6,717	792	64.8	72.4
1919	13,635	9,041	6,283	860	6,022	865	57.3	65.5
1920	12,848	9,223	6,463	936	6,498	944	61.1	70.0
1921	12,271	8,655	6,194	888	6,223	892	57.7	66.0

[1] Meat Production, Consumption, and Foreign Trade in the United States, 1907–1920, compiled by John Roberts, Bureau of Animal Industry, U. S. Department of Agriculture.

[2] Includes Federally inspected animals and estimates of farm and other slaughter.

[3] Domestic production less net export or plus net imports of beef, for 1920 and 1921, includes differences between stocks on hand at beginning and end of the year.

The production of beef and veal declined from 7,945,000,000 pounds in 1907 to 6,072,000,000 in 1914, a reduction of 1,873,000,000 pounds, or 24 per cent. During the same period the slaughter of beeves declined from 13,470,000 to 11,004,500, a loss of over 18 per cent. The slaughter of calves declined nearly 23 per cent. In response to the extraordinary demands for beef during the World War, the number of beef cattle increased rapidly. In 1918 the record number of 15,750,000 cattle and 7,767,000 calves were slaughtered. This heavy slaughter somewhat depleted the resources of the producers, and with the falling away of the export and domestic demand after the war only 12,848,000 beeves were slaughtered in 1920. In that year the production of beef and veal was only 22 per cent above that of 1914. It is noteworthy that the slaughter of calves in 1919 and 1920, nearly 50 per cent greater than in 1910, was the largest on record; and this slaughter, amounting to 9,041,000 and 9,223,000 head, in itself indicates a substantial liquidation of the war-time increase in cattle and a quick return to pre-war levels of production.

In the consumption of beef a striking reduction has occurred. From 6,967,000,000 pounds in 1907 there was a drop to 5,542,000,000 in 1915; i. e., of 1,425,000,000 pounds, or 20 per cent.[9] Partly because of the high prices of beef relative to the price of other foodstuffs and partly because of the increases in population the per capita consumption of beef and veal declined even more markedly than production—from 86.8 pounds per capita to 60.0, or 31 per cent, during this nine-year period.[10] The high wages and general prosperity of the war period resulted temporarily in a larger consumption, but that of 1920 amounted to little more than the 1915 consumption. The domestic beef consumption, therefore, is very elastic; high prices of beef and veal relative to other foodstuffs are likely to result in a materially diminished demand. As yet the per capita consumption of the United States is considerably higher than that of the principal importing nations.

In connection with production and consumption of beef and veal it should be noted that veal is predominantly a secondary product of the dairy industry. The production of veal amounts to only 10 per cent of that of beef; nearly two-thirds of the calves, as against only one-third of the beeves, are butchered in uninspected slaughterhouses—that is, the animals have been killed for local or intrastate consumption. The relatively small imports, largely in the form of live calves, are almost exclusively of Canadian origin. Since veal is a by-product of the dairy industry, which is one of the major agricultural activities in the United States, large quantities will always be available from American dairy herds. Moreover, dairy cows, as a rule, eventually find their way to the killers. Here, therefore, is a further large source of beef. The beef and veal yielded as a by-product of the dairy industry may roughly be estimated at between 1,500,000,000 and 2,000,000,000 pounds, or about one-fourth of the total production. Owing to the importance of dairying in the United States, this meat production as a by-product of dairying might seem to be less directly affected by a tariff on beef. The slow but steady growth of dairying during the past 20 years also

[9] The difference between decline in production as compared with decline in consumption is accounted for by a change from a net export to a net import basis for beef and veal after 1912.
[10] See Table 3, p. 9.

indicates that this form of beef production will become of still greater importance in the domestic supply. However, it can not properly be dissociated from other forms of meat production or from the tariff problem connected therewith.

SYSTEMS OF MANAGEMENT.

Beef cattle are raised in the United States under two general systems of management. One is found in the farming States east of the range country. The other prevails in the far West [11] and Texas, and in a modified form on unfenced or only partly fenced mountain pastures and "boundaries" in the Appalachian region.

Farming regions.—Under the first system many farmers in and around the Corn Belt either breed beef animals, largely to be retained on their own farms until ready for shipment to market for slaughter, or fatten the feeders and stockers purchased from the range States or from less favored near-by areas. Thus in certain hilly areas of the farming States, both east and west of the Mississippi River, it is more advantageous to sell the bulk of the cattle as calves, or as feeders at from 1½ to 2½ years of age.

Farm-bred cattle may be the offspring of strictly beef dams, or they may be bred in herds which also produce milk and butter. Those not sold as calves or as feeders may be fattened on grain, usually during their first or second winter, and disposed of as baby beeves, or as fat steers at slightly over 2 years of age, or they may be sold in butchering condition from grass in the fall, generally as "long" 2-year-olds. Formerly many were disposed of at about 3 years of age after being fattened on grain during the winter, or as "long" 3-year-olds from pasture, but the rise in price of feeds, pasture, labor, and value of the land during the past few years has discouraged the keeping of cattle to advanced ages and their feeding to more than moderate weights. Disposal of the cattle as baby beeves at about 15 months of age has increased considerably during the past 10 years because of a marked increase in demand for relatively small cuts of tender, well finished beef. This demand has come principally from dwellers in the cities. In consequence of this tendency to market cattle at lighter weights there has been a reduction in the beef supply that is not indicated in the diminution of the number slaughtered, but which is suggested by the greater percentage decline in production of beef as compared with the decrease in domestic slaughterings.

Cattle bred on the farms furnish a ready market for grass, grain, and roughage. They also convert straw into manure and provide winter work for farm labor. A large part of the financial return is due to the marketing of feed in the form of beef and pork at what, under favorable conditions, are better than farm prices for the feeds used.[12] It should be noted, too, that baby beeves, and corn-fed cattle not finished to too great a weight, command much higher prices per 100 pounds than does the bulk of the western stock.

[11] Montana, Wyoming, Colorado, New Mexico and westward, as well as western Kansas, Nebraska, and the Dakotas.

[12] It has been estimated that 19 per cent of the corn, 13 per cent of the oats, 12 per cent of the barley, 5 per cent of the rye, 6 per cent of the wheat, 51 per cent of the hay, and 97 per cent of the silage produced in the United States each year are fed to cattle. A large part of these amounts is fed to dairy cows and to thin animals purchased for fattening. Yearbook, U. S. Department of Agriculture, 1918, p. 676; 1919, p. 729.

are large areas of cheap grazing which are used by stockmen who sometimes have little or no investment in such land, and who pay only a nominal rental, or none at all.[13]

GEOGRAPHIC DISTRIBUTION OF DECLINE.

The two phases of beef production—on the farm and on the range—are of nearly equal importance, because many of the animals finished in the farm States are raised on the range. Of the total number of cattle hides tanned each year, one-half are from branded cattle, i. e., from animals which were calved in the range region, where ownership is indicated by branding.[14] Table 4 affords an indication of the relative importance of the range and farm States with respect to cattle raising. This table shows the trend only.

TABLE 4.—*Number of cattle, excluding milch cows, on hand January 1, 1907–1921.*[1]

(000 omitted.)

Region.	1907		1914		1919		1921
	Number.	Per cent of change.	Number.	Per cent of change.	Number.	Per cent of change.	Number.
The East [2]	2,851	−23	2,209	+11	2,443	−3	2,381
The South [3]	6,845	−17	5,704	+29	7,366	−2	7,224
The Middle West [4]	14,333	−32	9,713	+20	11,683	−2	11,444
The Central West [5]	11,189	−47	5,925	+51	8,917	−14	7,744
Far West and Texas	16,348	−25	12,304	+19	14,676	−4	14,077
Total, United States	51,566	−30	35,855	+26	45,085	−5	42,870

[1] Annual estimates, Yearbooks, U. S. Department of Agriculture, 1907, 1914, 1919, and 1921.
[2] Maine to the Potomac River.
[3] Potomac and Ohio Rivers southward, including Arkansas.
[4] Ohio to Missouri and north to Canada.
[5] The Dakotas, Nebraska, Kansas, and Oklahoma.

After 1907 the decline in the beef herds was general[15]—in the Middle West, 32 per cent; in the Central West, 47 per cent; and in the Far West and Texas 25 per cent. Thus the most noteworthy reductions occurred in the new farming sections, that is, on the prairies of the Middle and Central West. On the range the decrease in numbers was almost as large, although the percentage of decrease was less. By 1919, at the close of the reaction which had set in during the war, the greatest expansion had taken place in the South, Middle West, and Central West. The greatest numerical gains had occurred in the two regions last named, where the previous decline had been greatest. Only in the southern division, however, did the number of head in January, 1919, the year which marked the highest level of the war-time expansion, equal or exceed the figures for 1907. Lastly, the liquidation of the war-time increase appears to have been most prominent in the Central West, where the most striking changes had

[13] This grazing is cheap in the per acre charge; per head of animal grazed it is often little, if any, cheaper than good pasture land.
[14] The Producer, October, 1921, p. 11.
[15] In the annual estimates there is always a tendency to exaggerate decreases; yet the curtailment of the herds was rapid enough to attract widespread attention. The increases, likewise, are apt to be overestimated, but the war-time growth of the industry was one of the outstanding phenomena of those years. The statistics of the number of "cattle other than milch cows," it should again be noted, are indicative only of the trend; so far as the actual beef production is concerned, a much more accurate record appears in Table 3, p. 9.

previously occurred. It seems probable, however, that a part of this increase in the Central West may be permanent. Rapid homesteading in this region after 1907 at first greatly reduced the range herds, but the high prices of the war years undoubtedly led many settlers to adopt cattle as a permanent rather than as an opportunist or temporary enterprise. The dry years immediately preceding 1914 and the hardships they imposed on those who did not supplement crops with live stock, appear to have had some effect in stimulating the adoption of cattle as a permanent enterprise in subhumid areas.

The large expansion during the war period resulted in a striking increase in our exports of beef and veal, indicating the potentialities of the industry under the stimulus of high prices or under the stress of national emergency. However, the expansion may be attributed in part to an export buying that disregarded the abnormal advances in price. The shipping situation, moreover, placed a premium upon North American supplies, particularly as against those of Australasia.

Table 5 shows the increases in the acreage of wheat and hay, and in number of live stock, between 1914 and 1920. Despite the growing shortage of farm labor, there was a material increase in the area of most grain crops, particularly of wheat and hay. Yet live stock in general, and cattle in particular, also made pronounced gains. This was made possible through a much fuller use of roughages and through reductions in the exports of oil cake, coarse grains, and other feedstuffs.

TABLE 5.—*Number of cattle (exclusive of calves and dairy cows), sheep (of breeding age), hogs, and acreage of wheat and hay,*[1] *1900–1920.*

[000 omitted.]

Area and commodity.	1900	1910	1914 [2]	1919–1920
United States:				
Cattle.....number..	35,268	34,345	[3] 28,820	31,602
Sheep.....do....	39,853	39,644	[3] 35,998	[3] 36,753
Hogs.....do....	62,868	58,186	58,933	72,999
Wheat.....acreage..	52,589	[3] 44,263	53,541	78,243
Hay.....do....	39,133	45,744	49,145	36,548
Middle West:				
Cattle.....number..	8,710	9,290	7,810	8,052
Sheep.....do....	8,581	8,873	7,022	7,783
Hogs.....do....	31,737	27,965	27,813	35,765
Wheat.....acreage..	20,718	12,859	15,432	21,467
Hay.....do....	13,900	20,189	19,021	21,606
Central West:				
Cattle.....number..	7,348	6,691	4,765	6,314
Sheep.....do....	1,523	1,235	1,365	1,689
Hogs.....do....	9,323	9,616	8,397	8,194
Wheat.....acreage..	16,039	21,212	25,607	31,263
Hay.....do....	7,252	5,009	4,500	5,796
Far West and Texas:				
Cattle.....number..	12,251	12,371	9,900	10,980
Sheep.....do....	23,666	24,667	23,452	22,850
Hogs.....do....	4,127	4,168	4,889	5,006
Wheat.....acreage..	6,614	4,969	6,538	12,109
Hay.....do....	5,311	4,913	8,680	18,576

[1] Census figures 1900 and 1910, revised as in Table 3 (see p. 9). Census figures for cattle in 1920. All other figures are estimates, including hay for 1899 and 1909, owing to census inclusion of forage crops with hay, and to large areas of wild hay west of the Mississippi River. Both these items are largely excluded in U. S. Department of Agriculture estimates.

[2] U. S. Department of Agriculture estimates revised for comparability with census figures.

[3] Adverse weather at sowing time caused pronounced decrease in wheat area in 1909.

CAUSES OF REDUCTION IN THE BEEF SUPPLY.

It is clear that abnormal conditions were responsible for the expansion of the industry between 1915 and 1918. That the forces which reduced beef production prior to 1915 are again in operation is indicated by the unprecedented slaughter of calves during 1919 and 1920,[18] the subsequent reduction in the number of beef cattle on farms and ranges, and the diminishing production of beef. The import balance, moreover, reappeared in 1920 and 1921. To what extent may import duties offset these adverse forces?

The decline, prior to 1915, occurred in the range States as well as in the farming districts. On the range, homesteading, overstocking, and the operation of the land laws account for the decline; in the farming sections other uses of the land were found more profitable than beef production. On both range and farm the practice of producing lighter cattle has been a contributing factor.

In the pastoral regions, the encroachment of farm crops, or an attempt to grow them, was one cause of the decline prior to 1915. Before the enactment of the 640-acre grazing homestead act of 1916 homesteading in the semiarid regions west of the Missouri proceeded apace after earlier experiences with years of drought were forgotten. More recently large areas have been alienated for grazing homesteads under this act. Between 1900 and 1920 the area of unappropriated and unreserved public lands decreased from 917,135,000 to 200,000,000 acres. It does not necessarily follow that the coming of the small farmer or cattle grower permanently reduces the number of cattle in the range States, but temporarily at least the change from range to farm conditions almost inevitably reduces the number of live stock.

Homesteading has involved a loss beyond that consequent upon the reduction of the range. It has crowded stockmen into semiarid areas already stocked to capacity or has forced them to reduce their herds or to go out of business. Owing to the breaking up of the range, the cattlemen who remained often have found it harder to use the portions available for free grazing, since cattle, unlike sheep, are not herded and can not readily be directed to the best feeding grounds. A large percentage of the homesteaders plowed up the native grasses in order to grow grain under dry-farming conditions. They enjoyed only moderate success during favorable years, and during dry seasons failures were frequent. Only too often such settlers not only made it difficult for stockmen to use the adjoining range, but were themselves unable to finance the procurement of small bunches of live stock to graze it. The land filed upon under the 640-acre homestead act, for instance, is suited only for grazing. But it consists in large part of units lying between desert or winter ranges and summer grazing areas. Such grazing usually is vitally needed by neighboring stockmen for use in the spring before summer areas are ready or in the fall prior to the passage of the cattle to winter range. Entry thereon has forced many stockmen to go out of business or to curtail operations until the lands are patented. Eventually a large percentage of these homesteads will pass into the hands of stockmen or live-stock companies able to survive the present crisis and get control of funds or credit to permit such purchase. An advance in meat prices obviously should enable the smaller stockmen

[18] See Table 3, p. 9.

to compete with the large, well-financed companies in the purchase of these lands and to assist in the stabilization of the industry.

Further loss in the beef supply because of the reduced carrying capacity of the range has resulted from overcrowding and unregulated grazing upon the public domain. Authorities estimate that this loss may conservatively be figured at 25 per cent. Not only can the range carry fewer cattle, but there has also been a loss in their quality and weight.[17]

Upon most of the conditions outlined above import duties can have only an indirect influence, at least in the essentially pastoral areas. To the farming regions import duties are of more direct importance. While the changes noted above were in progress in the range region there was an appreciable decline in the breeding of beef cattle in well-developed sections of the Central West and also in parts of the Middle West. Dairying, hog, and crop production to a considerable extent displaced cattle raising. As land values rose, many producers purchased feeder cattle instead of breeding them; others combined beef production with dairying; and still others, concluding that more profit was to be made from the sale of crops, turned to farming and ceased raising cattle of any sort, except incidentally to consume roughage and surplus coarse grains. In the farming sections, then, import duties may serve as a more substantial corrective. Here there is little question that such duties will stimulate production, but in some measure this expansion would merely involve a shift from one form of production to another. A further increase might result from a more intensive production, based in part on more complete use of rough lands and rough feeds. Gains by either method are, of course, subject to the reduced demand for beef which high prices usually effect.

A distinction should here be made between short and long term causes. Temporarily, there is a world surplus (1921–22). The impaired purchasing power of Europe and the war-time increases in production in exporting countries have disastrously affected the domestic and the world market. But the outstanding facts in the world's beef trade are that consumption is everywhere overtaking supply with a downward tendency in per capita consumption; that the exporting nations contribute only a small percentage of the international requirements, and that no immediate increase in their surplus is to be anticipated. In short, the state of the world's demand and supply is such as to maintain, in the long run, the more expensively produced American product, as well as that of the exporting countries. There may, however, be a lengthy interval between present and normal conditions; it is conditions at the present time (1922) that are causing grave concern on the part of domestic producers.

POSSIBILITY OF EXPANSION.

Future increases in the domestic production of beef are chiefly contingent upon settlement of the land problem, range improvement, and remunerative prices. The first two primarily concern the area west of the one hundredth meridian; the third affects the industry throughout continental United States.

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[17] Pasture ranges which formerly supported 3,200,000 cattle now carry only 640,000 head; in 30 years the carrying capacity of the range has been much reduced. (U. S. Department of Agriculture Bul. 72. See also, Yearbook, Department of Agriculture, 1915, p. 299 ff.)

The land question is as pressing upon the cattlemen as upon the sheepmen.[18] After the lands are patented stockmen able to survive will largely increase their holdings through purchase, since many of the homesteaders undoubtedly will fail to make a permanent home and will patent for sale to range users. Unless the smaller stockmen survive, it is the strong cattle companies, with abundant resources that will absorb these small units and thus tend further to defeat the purpose of the homestead act. Many homesteaders on 320-acre units have already disposed of their land in this manner. Such amalgamation of holdings has taken place on a large scale in the sand hills of Nebraska, on lands that were homesteaded in 640-acre units under the Kinkaid Act; sales of lands already patented under the grazing homestead act have also begun. This concentration of ownership will make for stability in use of the land, warrant expenditures for water development and other improvements, and will make range improvement practicable, particularly where land can be secured in sufficiently large areas to warrant fencing.

Range improvement as a means of expansion in the cattle industry is equally as important as stabilization in use of the land. In the national forest reserves striking increases have been achieved in the carrying capacity of the ranges. These indicate that notable improvements may generally be effected after enough of the land has passed into private ownership to give individuals substantially complete control of given areas, assuming that the value of such betterment and the best methods for its attainment are fully realized by the stock raisers. Little can be done on the uncontrolled public range, since it is used by many ranchers and all users would have to agree on the policy to be pursued. If portions of the grazing were spared by some, the results would generally be nullified by others. On the remaining open range, Federal control, similar to that exercised in the forest reserves, would yield much quicker results and stimulate like work by ranchers. Immediate betterments of this nature are believed essential to the maintenance of the existing carrying capacity of the range.

Both these aids—settlement of the land problem and range improvement—probably are matters of the more or less distant future. That of remunerative prices is more immediate, if much of the war-time gain is to be maintained, possibly even if herds are to be maintained at pre-war figures. Although the prices of cattle have dropped to pre-war levels, costs of labor, fencing, freight rates, interest charges, and the prices of the products the producer buys have not correspondingly decreased. It is true that large quantities of beef and veal will always be produced in the United States. Millions of acres of pasture land in the farming States and still larger areas of range can only be used for live-stock production.[19] Large quantities of beef

[18] See report of U. S. Tariff Commission, The Wool-Growing Industry, 1921, ch. 8.

[19] See Employment and Natural Resources, Office of the Secretary, Department of Labor, 1919, p. 51 ff. Also Yearbook, Department of Agriculture, 1915, p. 299 ff., and Bulletin 626, Department of Agriculture, 1918. Of slightly over 1,000,000,000 acres (or 53.8 per cent of the total area of continental United States) reported as not in farms in 1910, three-fifths (642,000,000 acres) were in the Mountain and Coast States. Of this fraction, 52 per cent (390,000,000 acres) was land suitable only for grazing or which could be used to some extent for grazing purposes. There was an additional 120,000,000 acres of such land east of the Mountain States and largely west of the one hundredth meridian. Of the total land in farms (878,798,325 acres), 33 per cent (291,439,515 acres) was reported as improved and unimproved pasture. Of this portion approximately 60 per cent lay east of the one hundredth meridian. With the exception of land pastured in rotation, stock raising is the only use to which most of this land can ever be put. The bulk of the land east of the one hundredth meridian which was reported as not in farms consisted of timber, cut-over, and swamp lands, a part of which was used for grazing. A much larger part can be used for that purpose.

and veal will also be available as a by-product of dairying.[20] But if the industry is not profitable, cattlemen and farmers will curtail their herds. They will stock their farms and ranches only with the number of cattle that they can carry through the winter at least cost for labor and dry feed, with the idea that the pasture area will then carry this reduced number better and for a longer part of the year, and will thus further cheapen winter costs. In the farming districts feeding will also be curtailed. Cattle feeding is a speculative enterprise. The feeder gambles on the future market, both for fat cattle and for feed. It is easy to curtail or withdraw from feeding.

Cost of Production.

In the cattle industry costs of production differ widely with the locality, and with the system of management, both in the same year and from year to year. Then, too, there is often marked variation from farm to farm, or from ranch to ranch, under the same system of management and with only a line fence separating the two units. Thus two ranch herds with no perceptible difference in range, feed, water facilities, quality of animals, or annual losses will show large differences in production cost if one outfit weans 80 per cent and the other only 60 per cent of calves. The same general statement applies to farms where cattle are bred. The breeder in the "black belt" of Alabama, whose animals feed on alfalfa which grows during virtually 11 months of the year, and who normally has almost no labor charge other than for occasional feeding with hay, would naturally show a production cost below that of a breeder in eastern Ohio, where the carrying capacity of the pastures is lower and where the cattle must be hand fed about six months each year. Detailed figures prepared by the Department of Agriculture, as well as those reported by the different Corn Belt States, show a very wide range in the cost of fattening cattle, particularly during the war years, when feedstuffs were disproportionately high in price. For these reasons and because of abnormal conditions during recent years, the Tariff Commission has made no effort to secure costs of production in the cattle industry, but has relied upon cost studies made by the Department of Agriculture, often in cooperation with certain of the States in the Mississippi Valley.

Data on the cost of production in the cattle industry were gathered by the United States Department of Agriculture for most of the years from 1912 to 1920, inclusive. Much of this information was published by the Federal Trade Commission in its report on the meat-packing industry in December, 1919, but the data are of sufficient importance to justify a recapitulation of some of the published tables. Most of the recent studies have been upon the cost of fattening cattle, but for the three years 1914–1916 the costs of raising calves in the Middle West were obtained. The latter data are pertinent to the present inquiry because they indicate the profit

[20] Some expansion in the beef supply may also result from breeding up the quality of the cattle, from tick eradication in the South, and from the gradual elimination of animal diseases. It has been estimated that the average yield of dressed beef is 53.5 per cent. An increase of only 1½ per cent per head would increase the annual beef supply by approximately 200,000,000 pounds—more actual beef than has been imported in any one year. Yearbook, U. S. Department of Agriculture, 1920, p. 49.

or loss involved in normal times in raising beef calves up to one year old, and in fattening beef steers, but failure to ascertain the cost between one year of age and the time cattle are sold for fattening or for slaughter results in an incomplete portrayal of the cost of production. The studies which deal with cattle fattening cover that phase of beef production with exemplary thoroughness.

It should be noted that these figures include in the cost of production items that are sources of income to the farmer. Feed, the largest item of expense, is charged, not at cost, but at the prevailing farm price; that is, the wholesale price at the nearest shipping point less cost of delivery to that point.[21] Herein usually appears a hidden profit, though in some cases it may be a hidden loss. Large quantities of coarse roughage, otherwise virtually unsalable, are debited to the cattle at a low value. Labor which otherwise is less fully occupied during the slack winter season is charged to cost whether performed by the feeder or by hired men. Interest on the value of the cattle is charged at 6 per cent. A charge is made for farm equipment, put to a fuller use, and for pasture used by the cattle. Pork made from undigested grain voided by the cattle is credited to them, as is the estimated value of manure. The above charges are legitimate if the purpose is to compare beef production with crop production, or beef production under different systems of management or on different farms, but under strict cost-accounting methods they are not deemed legitimate if the net income from the business is to be ascertained. Since the "net costs" shown in the tables are not true net costs, the "net losses" therefore are not true net losses.

Over a series of years the cattle raiser or feeder can not expect, in fact really does not expect, to show earnings much in excess of interest on investment, value of feed and labor, and rent of equipment. However, the cost studies which follow show that the cattle feeders, on the average, made virtually no profits above their imputed net costs from 1912 to 1916, and failed to meet their imputed net costs in later years. The true net profits or losses are impossible to ascertain.

COST OF KEEPING COWS AND RAISING CALVES.

During the three years 1914–1916, inclusive, records were obtained for more than 18,000 cows and their calves. The results of this study are summarized in the table following:

[21] Purchased feed is charged at cost laid down at the farm.

TABLE 6.—*Cost of keeping cows and raising calves and yearlings in Iowa, Missouri, Nebraska, and Kansas.*[1]

[Three-year average, 1914-1916.]

	Cows of beef type (milk taken by calves).	Cows milked (calves fed on skim milk.)	Combination of first and second method.	Cows partly milked (calves suckle remainder).	Some cows milked; other cows nurse calves.
Number of farms	354	157	139	95	[illegible]
Number of cows	11,261	1,990	3,182	1,541	772
Number of cows per farm	31.80	12.67	22.89	16.22	19.31
Cost of maintaining herd:					
Gross cost of maintaining a cow	$34.23	$55.30	$43.42	$41.75	$41.31
Credits other than calf	4.79	52.12	25.69	22.25	31.95
Net cost of maintaining a cow	29.44	3.18	17.74	19.50	11.36
Cost of raising a calf until weaned:					
Cow charge	34.47	4.02	20.73	22.23	13.73
Bull charge	2.25	3.95	2.82	3.18	2.09
Feed	.01	9.73	4.76	.04	.30
Labor		2.36	1.02	.02	.16
Total cost at weaning time	36.73	20.06	29.33	25.47	17.07
Cost of raising a yearling:					
Number of farms	296	141	131	84	32
Average number per farm	23.23	10.24	17.99	12.55	13.97
Cost at weaning[2]	$36.85	$20.64	$29.56	$24.81	$17.08
Cost of winter feed	11.44	9.48	11.14	10.95	9.84
Other charges	4.60	5.00	4.65	4.71	4.68
Gross cost	52.89	35.12	45.35	40.47	31.62
Credits	1.60	1.94	1.50	1.53	1.66
Net cost per head	51.29	33.18	43.85	38.94	29.96
Number of yearlings inventoried as of May 1	6,783	1,294	2,395	1,007	358
Value of yearlings inventoried	$38.31	$30.92	$34.17	$35.91	$33.37
Loss per head on yearlings inventoried[3]	$12.98	$2.78	$9.74	$2.98	
Profit per head on yearlings inventoried					$3.41
Number sold prior to inventory	453	170	123	140	61
Sale value of yearlings sold	$45.05	$33.65	$44.06	$40.19	$37.00
Loss per head on yearlings sold[3]	$6.52		$7.59		
Profit per head on yearlings sold		$3.17		$4.35	$18.03

[1] Data gathered by the U. S. Department of Agriculture; published by the Federal Trade Commission in its report, The Meat-Packing Industry, Pt. VI, p. 12.

[2] In this part of table change in number of farms causes change in cost at weaning time.

[3] $9 average loss, 12,984 head of yearlings.

The salient features of Table 6 are (1) the net costs of maintaining cows, (2) the cost of calves at weaning time, (3) the cost of yearlings, and (4) the inventory or selling value and net gain or loss per head on yearlings.

The net annual cost of maintaining a cow is highest in the beef class and lowest in the dual purpose class, where the animal is milked and only skimmed milk fed to the calves. In the first instance it was nearly $30, and in the second, after the value of the milk was credited, only $3.18.

The cost of raising calves until they are weaned ranges anywhere from $17 to $36, according to their class and the method of management followed. Yearlings are raised at a cost of from $30 to $51.

For the various classes of yearlings, the inventory value or sale price does not vary as much as the costs. If the inventory value and selling prices of the yearlings be averaged, in the case of the beef type there appears a loss of $12.60 per head. The loss in the

several groups decreases progressively to the double nursing class, in which there is a gain of $5.45. The average weighted loss per head in all five groups for yearlings inventoried, as well as for those sold, was $9, an amount almost equal to the charge for winter feed. It should be noted, however, that at 1 year of age these yearlings were at the point of heaviest charge, after a winter on dry feed and with the entire cost of cow and bull maintenance charged against them. After a summer on grass they would make a much better financial showing as "long" yearlings, and it is at the latter period, or subsequent thereto, that most beef cattle are sold, whether for immediate slaughter or for fattening. The cost and profit or loss at 1 year of age may be quite misleading so far as concerns normal profits in the cattle industry.

Table 7 shows in detail the cost of keeping beef cows in various States during the years 1914–1916. Cost data for these cows also appear in column 1 of Table 6, page 20. Table 7 is presented primarily for its general interest.

TABLE 7.—*Cost of keeping beef cows.*[1]

[11,261 head, 1914–1916.]

	Number of farms.	Number of cows.	Charges.						Credits.			Net cost.
			Feed.	Labor.	Equipment.	Interest.	Other charges.	Total.	Extra calves.[2]	Manure.	Total.	
1916.												
Iowa	48	1,506	$24.55	$3.34	$2.88	$4.24	$1.21	$36.22	.....	$5.90	$5.90	$30.32
Missouri	33	822	21.33	3.74	2.30	4.30	1.08	32.85	.....	4.08	4.08	28.77
Nebraska	13	456	18.55	3.76	1.65	3.72	1.13	28.81	.....	4.94	4.94	23.87
Kansas	30	1,231	19.00	3.149	.77	3.72	1.01	28.19	$0.31	3.43	3.74	24.45
Weighted average for 1916	124	4,015	21.72	3.60	2.09	4.08	1.12	32.61	.08	4.72	4.80	27.81
Weighted average for 1915	110	3,703	24.80	3.53	1.83	3.78	.91	34.85	.04	4.89	4.93	29.92
Weighted average for 1914	120	3,543	24.60	4.21	1.67	3.87	1.02	35.37	.....	4.66	4.66	30.71
3-year weighted average	354	11,261	23.64	3.79	1.87	3.91	1.62	34.23	.04	4.75	4.79	29.44

[1] Published by the Federal Trade Commission in its report, The Meat Packing Industry, Pt. VI, p. 23.
[2] Twin calves.

It will be observed that there is no credit whatever for milk because the calves run with the cows, but there is a credit of $4 to $6 per head for the manure, leaving a net cost in the various States of from $24 to $30 per head. The feed cost is several times larger than all other items of expense combined, about $22 out of an average cost of $27.80 for the year 1916. Labor charges are about $3 to $4 per head, or approximately 10 per cent of the total, while interest charges are somewhat greater, and charges for equipment are substantially less.

Data on the cost of range cattle production [22] are also presented for their general interest. On six Texas and Oklahoma ranches the cost of raising calves to the age of 8 months ranged from $35 to $51 during the period 1914 to 1917. On five of these ranches the cost

[22] Data gathered by the U. S. Department of Agriculture; published by the Federal Trade Commission in its report, The Meat Packing Industry, Pt. VI, p. 39.

at 20 months old ranged from $52 to $73; at 32 months to 3 years old they ranged from $65 to $97 on four ranches. The charge against calves at weaning appears to have averaged higher than for the beef calves, as shown in column 1, Table 6. As "long" 2-year-olds the reported cost, which comprises all items of overhead—including marketing charges ranging from $2.85 to $4 per head—was higher than the average cost, laid down at the farm, of the 47,000 head of beef steers for which data appear in Table 8.

Owing to the necessity of using expensive dry feed during the drought period, which lasted from 1916 to 1918, inclusive, all these costs were raised considerably. This was a serious matter for the ranchers, and also for the buyers of their cattle. Animals from this area are extensively drawn upon by graziers and feeders to the northward. In fact, in 1914 Texas and Oklahoma carried four-fifths as many cattle as were present in the Rocky Mountain and Pacific Coast States; as a breeding ground for range cattle, these two Southwestern States are almost as important as the entire far West.

Another cost study was made in 1914 in the far West.[23] In the Southwest, calves at 12 months of age showed an average cost of approximately $18 per head; as 2-year-olds the average was about $24. As "long" 2-year-olds—i. e., about 30 months—these animals would cost about $28.[24] A very large part of these southwestern cattle are shipped northward for 12 to 18 months grazing on the better grasses of the central and northern ranges; i. e., these cattle are shipped as stockers. On the northern ranges the cost at 12 months of age averaged $31, at 2 years old $45, and as "long" 2-year-olds about $52.[24] These costs include a hidden profit where feeds used were grown on the ranch, but not otherwise. As no interest, depreciation, or maintenance charges were made for ranch equipment or improvements, fences, water developments (particularly important in the Southwest), or any other form of overhead, these costs are probably much below the true figure. Since 1914, feed, labor, rentals, marketing, and overhead charges have increased greatly, though during 1921 labor charges have receded considerably from war-time levels. However, the market decline apparently has been far greater than the recent lowering of costs.

COST OF FATTENING STEERS.

For a number of years the Department of Agriculture has conducted investigations regarding the cost of fattening steers in the Corn Belt. Cattle feeding furnishes an outlet for the thin cattle which reach the markets, particularly during the heavy autumnal range run at the close of the grazing season. This outlet is of great value to all producers who market their animals in the fall, because it removes large numbers of cattle not well suited for slaughter, but which would glut the butcher market and greatly depress prices if forced into slaughter channels at that time. The feeder outlet thus not only sustains cattle prices but tends to equalize the supply throughout the year. It increases the total supply of beef through gains made by animals put on feed and augments greatly the supply of high-quality beef. There is a wide difference in the quality of meat on a 1,000-

[23] Report 110, Office of the Secretary, U. S. Department of Agriculture.
[24] Calculated on the basis of cost at 2 years of age as given in this report.

pound feeder steer and that carried by the same animal when finished to a weight of 1,200 to 1,300 pounds.

Results of a study for the years 1912 to 1916, inclusive, are presented in Table 8. Data are tabulated for 47,000 head—667 in Illinois, 4,586 in Missouri, 1,718 in Kansas, and 40,141 in Nebraska. The systems of feeding vary little in the different States. For Missouri and Nebraska the data are for a sufficient number of cattle to give the figures substantial value. Particular significance is attached to the average for all the droves in the various States, since it relates to operations for five years and is roughly representative.

TABLE 8.—*Cost of fattening cattle in the Corn Belt.*[1]

[Averages for 1912-13 to 1916-17, inclusive.]

Item.	Illinois.	Missouri.	Kansas.	Nebraska.	General average.
Initial cost per head	$71.69	$56.39	$72.04	$68.19	$67.08
Feed	40.60	28.15	42.56	38.04	37.34
Labor	3.04	1.91	1.60	2.04	2.15
Equipment	.27	.84	2.90	2.24	1.56
Interest	2.32	1.60	2.93	2.01	2.21
Miscellaneous	1.98	.86	1.30	4.19	2.08
Marketing cost	2.56	3.39	2.83	3.14	2.98
Gross cost	122.46	93.14	126.16	119.85	115.40
Credit, pork and manure	10.79	4.26	4.93	7.50	6.87
Final net cost	111.67	88.88	121.28	112.35	108.53
Sale price	115.21	83.97	127.81	110.52	109.38
Profit per head	3.54	.....	6.58	.....	.85
Loss per head	.....	4.91	.....	1.83	.....
Days on feed	151	137	147	142	.....
Pounds gained per day	1.60	1.49	2.18	1.76	.....
Sale weight per head	1,266	989	1,332	1,239	.....
Number sold	667	4,586	1,718	40,141	47,112
Number of farms	8	3	2	15	.....

[1] Based on data gathered by the U. S. Department of Agriculture and published by the Federal Trade Commission in its report on The Meat Packing Industry, Pt. VI.

The profit or loss for the feeding seasons of 1912 to 1916 varied considerably from State to State and from year to year. The season of 1912 was favorable; the reverse was true for 1913–1915, while that of 1916 was unusually profitable in all four States. The average profit for each State that year was large enough to turn a general average loss for all the States during the preceding four years into a slight profit for the five-year period. This amounted to 85 cents per head, or 4 cents per 100 pounds, on 47,112 steers. The initial cost of the feeder cattle averaged 58.1 per cent of the gross cost of the finished animals; feed averaged 32.4 per cent, labor 1.9, equipment 1.3, interest 1.9, miscellaneous 1.8, and marketing 2.6 per cent during these five years. For reasons already given, the profit per head in Tables 6 and 8 is below the true profit, owing to hidden income in items of cost, especially in the feed. Under the system of accounting used the losses are also exaggerated.

For the year 1916–17 a separate study was made to determine the profit or loss in fattening steers. Table 9 shows the cost of fattening 9,541 steers in the Corn Belt. To these figures have been added data obtained by the Department of Agriculture,[25] on the fattening of 13,970 cattle in 1918–19, and 15,210 in 1919–20.

[25] Loaned to the U. S. Tariff Commission in advance of publication.

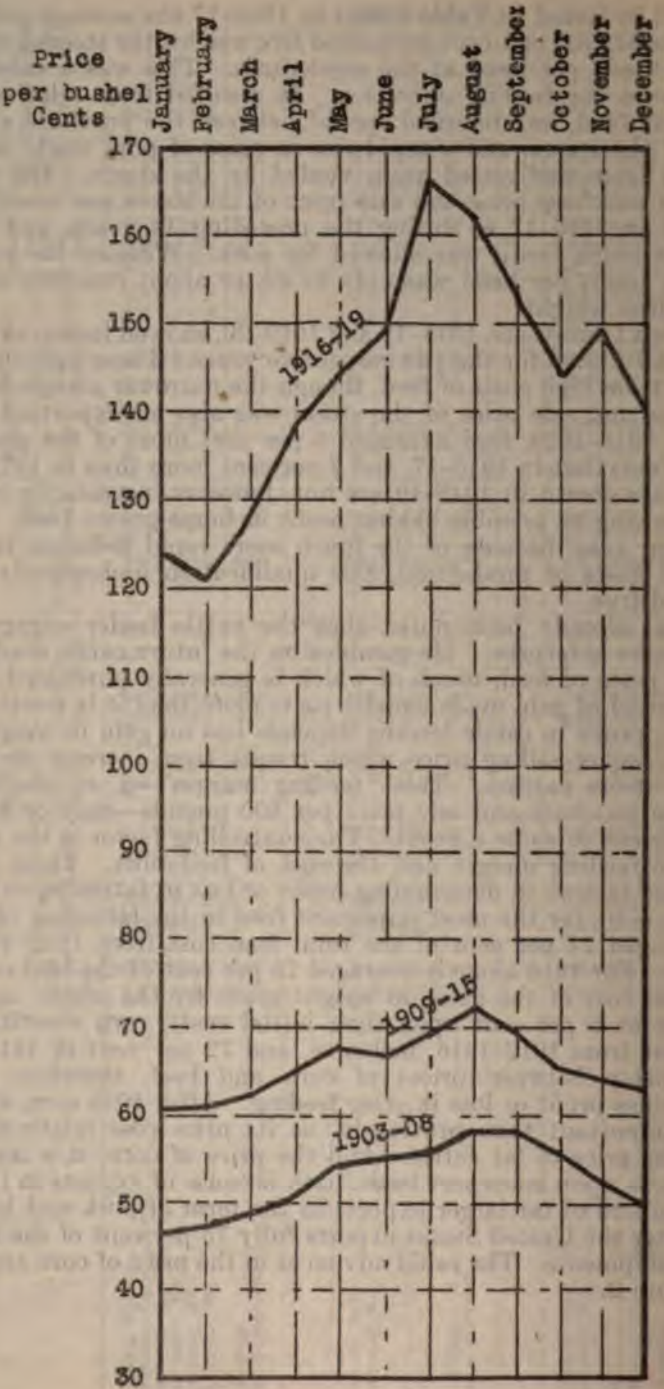

FIG. 2.—Average monthly price of corn, Chicago (1903-1908, 1909-1915, and 1916-1919).

The Marketing of Cattle.

THE COST OF MARKETING.

The increased cost of marketing is in some measure responsible for the present plight of cattle shippers. Between net cost in the feed yard and sale price at the market the margin is often so narrow that even under normal conditions the actual marketing cost can easily turn a small book profit into a loss. Under such abnormal conditions as prevailed in the late fall of 1920 and in 1921 freight charges were sometimes almost prohibitive. Such charges have particularly affected cattle feeders, since their operations involve a transportation of cattle from place to place. With the rapid return of prices to pre-war levels, the disproportionate cost of marketing in the autumn of 1921 augmented the difficulties of producers. The chief items in the cost of marketing are (1) freight; (2) loss in weight in transit; (3) feed in transit; (4) commission charge for selling; and (5) yardage and feed.

THE CENTRALIZED MARKETS.

The marketing of cattle in the United States is greatly simplified by the system of centralized market points with their stockyards and large slaughtering and packing plants. Of the total sales, the proportion disposed of through the central markets ranges in the different sections from 40 to 85 per cent.[26] The proportion is highest, about 85 per cent, in the Middle and Central West. Here a large part of the corn crop is marketed in the form of cattle which are bought or raised to consume the grain. For the most part these go directly to the killers. On the other hand, a large proportion of the cattle shipped annually from the range country, as well as from the Appalachian and contiguous territory, is sold to feeders in the Corn Belt or in farming sections to the east; these are grass or corn fattened before reaching the market centers and meet a demand for the better qualities of beef. American corn-fed beef commands a price premium in the world markets.

The seven chief primary markets of the Corn Belt—Chicago, Kansas City, Omaha, East St. Louis, St. Joseph, Sioux City, and St. Paul—receive the great bulk of the annual shipments. In the years 1916-1920 the annual receipts at these markets averaged 12,894,000 head, or 57 per cent of the average receipts of 22,200,000 head at 54 markets. These figures, however, do not adequately show the importance of the large primary markets because of duplication in reported receipts of cattle at the various centers. With but one exception, live stock unloaded in transit, for instance, is always included in receipts. Stockers and feeders appear at least twice and sometimes more than twice, at different markets, and there is also some reforwarding of fat cattle. Consequently the slaughterings at these seven markets is a better index of their importance. In the period 1916–1919, 8,894,000 head of cattle, or 70 per cent of the annual average number of cattle slaughtered under Federal inspection, were butchered at these points.

The average monthly receipts, local slaughter, and stocker and feeder shipments for the seven leading markets in the Middle West

[26] See Report 109, Office of the Secretary, U. S. Department of Agriculture, 1916, p. 10.

for 1916-1920, inclusive, are shown in Figure 3. Receipts sho
pronounced but logical increase during the fall months, when
grazing season closes. These curves show the typical seaso
movement throughout the country east of Denver and north of F

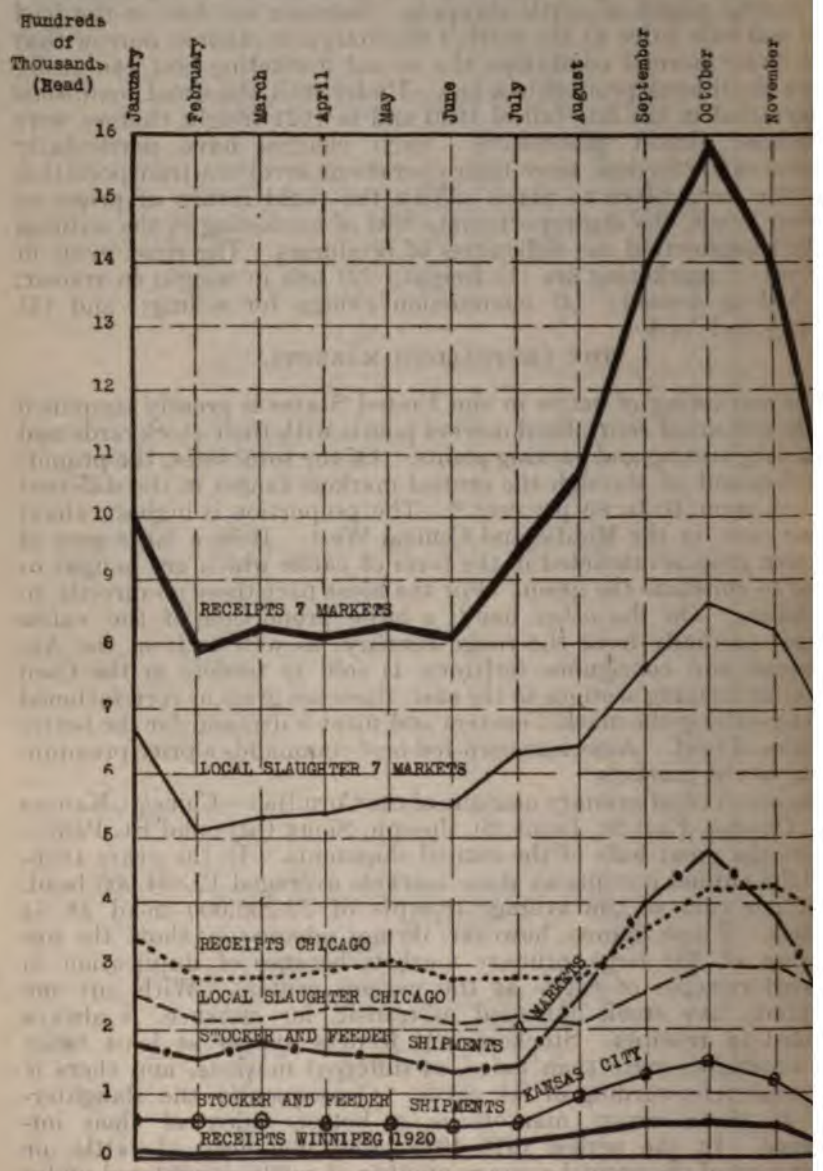

FIG. 3.—Monthly receipts, local slaughter, and stocker and feeder shipments, 7 markets (1916-

Worth. At the various markets there are minor fluctuations
to local conditions, but they all show the typical autumnal rise, cau
by heavy shipments of range and other cattle at the close of the s
mer grazing season. The receipts at Canadian markets are likew

heaviest in the fall for the same reason, so that the bulk of the Canadian shipments during recent years have come at a time when they swelled the already large domestic marketings.

The local slaughter curve in Figure 3 follows the same general course as receipts, but shows much less of a rise after July because of stocker and feeder shipments from primary markets to farms and because of an increase in the reforwarding of fat cattle. The stocker and feeder curve follows the same general course as the others, but with the difference that it shows a slight rise in March. This difference is due mainly to the movement back for finishing or for further finishing of cattle shipped to market mainly from points north of Oklahoma. The seven markets mentioned handle an annual average of 2,850,000 stockers and feeders, or 64 per cent of those reported from the 35 markets which are of appreciable importance in this trade. Kansas City shipped 30 per cent of those handled at the seven points shown in Figure 3.

In Figure 3 are also shown receipts and local slaughter at Chicago, the leading cattle market of the world, whose annual cattle slaughter exceeds the combined slaughter of the two next largest American markets. Chicago is the ruling domestic market for cattle. At other markets the prices of cattle usually correspond quite closely to those at Chicago when difference in shipping costs is taken into consideration.

MARKET PRICES.

Since 1900 the farm or producer's price of cattle has manifested a strong upward tendency. In 1905 the farm price of "cattle other than milk cows" was $15.15 per head; in 1914 it was $31.13; and in 1919 the peak was reached with $44.22 per head. In 1921 the farm price, $31.41, was at the pre-war level. Prices of milk cows showed substantially the same trend.

A number of curves are presented in Figures 4 and 4A to show the seasonal trend of cattle prices at Chicago, and thus fairly accurately for the United States in general. The average price for three series of years, 1903–1908, 1909–1915, and 1916–1920, is charted in the form of monthly averages for a number of grades of cattle. These three series of years not only indicate the effect of seasonal marketings on seasonal prices, but they also show the price trend during three distinct phases of the beef trade, (1) 1903–1908, the period of heavy exports of domestic beef; (2) 1909–1915, when this country was losing its export trade in the face of increase in population and decline in production; and (3) 1916–1920, the war years, with their abnormal demand and price conditions. Domestic and foreign prices of beef are shown in Figures 7 and 8, opposite pages 78 and 79.

It is important to note that there is a distinct demand for different types and qualities of live cattle. This diversity in demand, as well as seasonal variations in supply, results in material price variations. Furthermore, it has also resulted in an import trade in certain types of cattle coexistent with an export trade in other types, i. e., feeders and stockers were a more or less regular item in our import trade during the period when this country was a heavy exporter of finished beef cattle.

It will be noted that stocker and feeder cattle uniformly sell price lower than that of good butcher steers, but in each seri years the price of stockers and feeders has averaged higher from winter to midsummer than during the fall and early winter mo This is mainly due to the fact that from late winter to midsum the animals which go out for further finishing are relatively fe

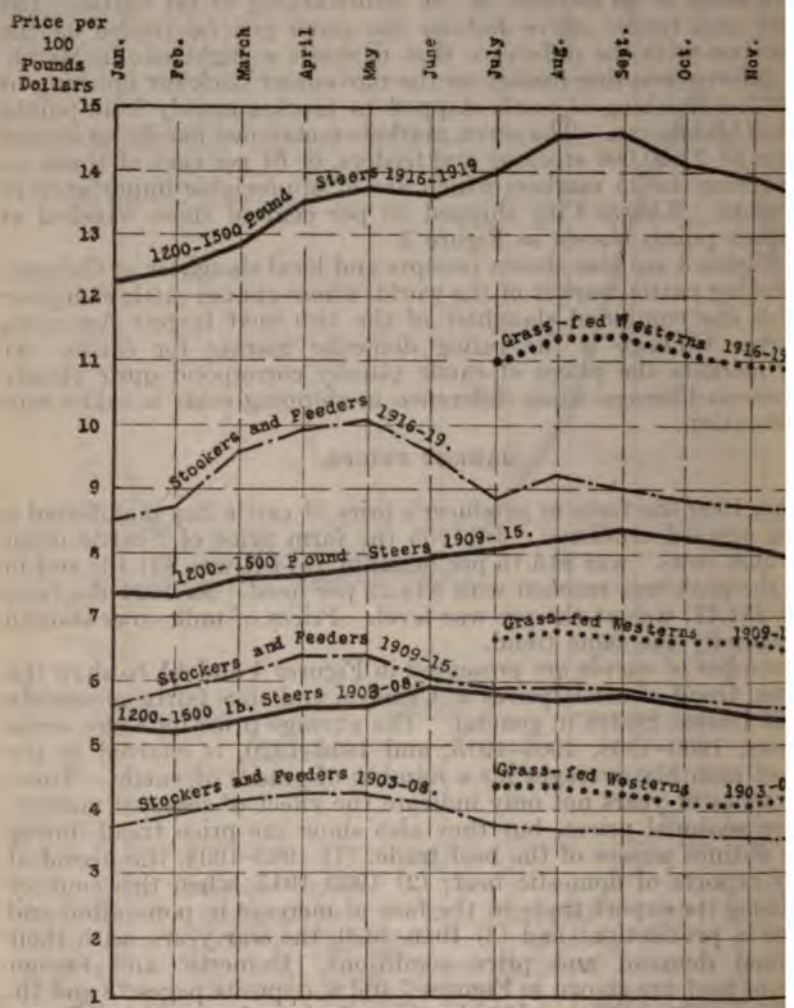

FIG 4.—Average monthly price of cattle, selected grades, Chicago (1903-1908, 1909-1915, and 1916-

number; they have passed most or all of the winter on dry feed, therefore are worth more to the grazier because of the cheap g which can be made on grass during the grazing season soon to or at hand. The cattle feeders compete more sharply for t because the prices of fat cattle for a number of months there usually rise fairly steadily, and there is an opportunity to get t

heavy feeder animals back on the market in better flesh before prices are forced down by heavy autumn receipts. If put on a fattening ration these cattle are usually fed not longer than 90 days; many are returned to the market in 60 days or less. A large proportion are shipped from grass in late summer.

The prices of beef cattle average higher in the summer because animals fattened in winter are in large part marketed by June. In summer the main reliance of the butchers, aside from part of the feeders which move out to farms for fattening after midwinter and considerable range receipts from Texas and contiguous territory, is on animals from limestone areas, where the rich blue-grass pastures enable graziers to turn off well-finished cattle from grass. These

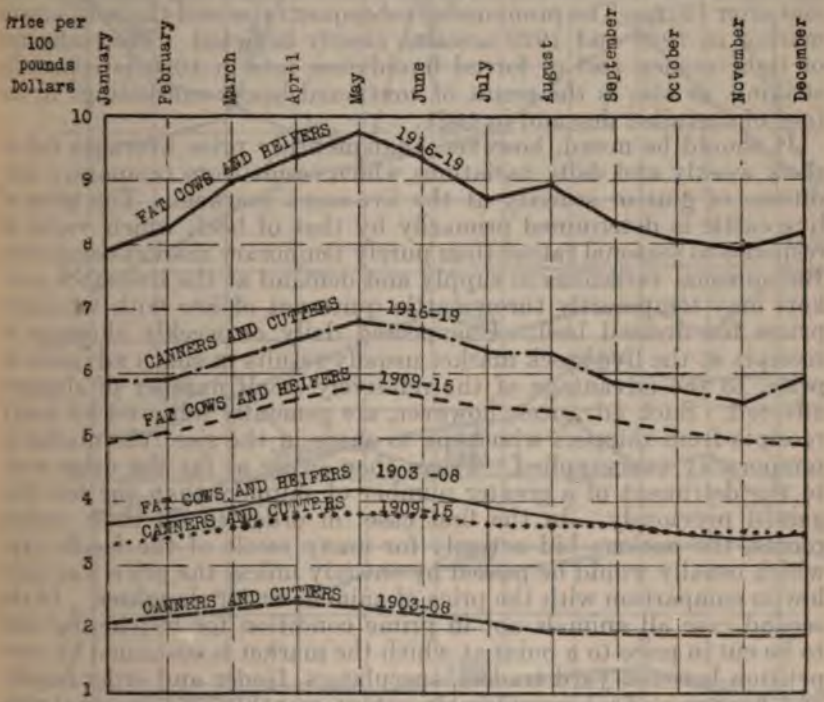

FIG. 4A.—Average monthly price of cattle, selected grades, Chicago (1903-1908, 1909-1915, and 1916-1919).

pastures usually become quite dry after midsummer; this fact places an added premium on well-finished animals prior to the beginning of heavy autumnal marketings.

In the fall months prices decline with the heavy receipts at the close of the grazing season. The fall in prices is somewhat influenced by the lower average quality of receipts, because a large percentage of both "native" or farm States and western cattle are thin and are shipped back to country points for further finishing; these are, however, available for slaughter if their price is sufficiently favorable.

Detailed price movements during and since the war.—With the abnormal demand for all meats after 1915, there was a strong upward trend in the market until early in 1919. But rather violent

fluctuations occurred during the entire period. Du
1920 in particular, the market fluctuations were unp
extent, owing to changes in export demand which
high American prices, unfavorable exchange, desir
meats, the decline in European credit, and the desire of
to utilize large stocks accumulated in Australasia durin
scarcity subsequent to 1917. More recently, somew
domestic consumption in the United States has also
portant factor in the market. These variations in n
for individual years are shown in Figure 5.

In this figure will be noted substantially the same ni
price variations prior to 1912 as in Figure 4. The effe
ing exports and the rising domestic market show very
and after 1912. The pronounced subsequent rise and t
market in 1919 and 1920 are also clearly depicted.
of tight money and of forced liquidation late in 192
striking, as also is the result of continued heavy mar
face of curtailed demand in 1921.

It should be noted, however, that monthly price a
show weekly and daily variations which result from t
ditions of glut or scarcity at the live-stock markets.
live cattle is determined primarily by that of beef, w
response to seasonal rather than purely temporary mar
But unusual variations in supply and demand at the l
kets may temporarily throw cattle quite out of line
prices for dressed beef. Unexpected daily or weekl
receipts at the live-stock market usually results in sha
price, to the advantage of the relatively small numb
affected. Such advances, however, are generally follo
receipts from shippers who hope to share in the rise;
temporarily oversupplied. Prices then swing as far
to the detriment of a greater number of shippers tha
gained previously. In the first case, in order to fil
rooms, the packers bid actively for many cattle of t
which usually would be passed by entirely unless the
low in comparison with the price of animals fit for slau
second case all animals not in prime condition for b
to be cut in price to a point at which the market is sus
petition between yard traders, speculators, feeder an
and packers. To a considerable extent monthly and
ations in price of live cattle represent a mean of tempo
ties which result from the above causes.

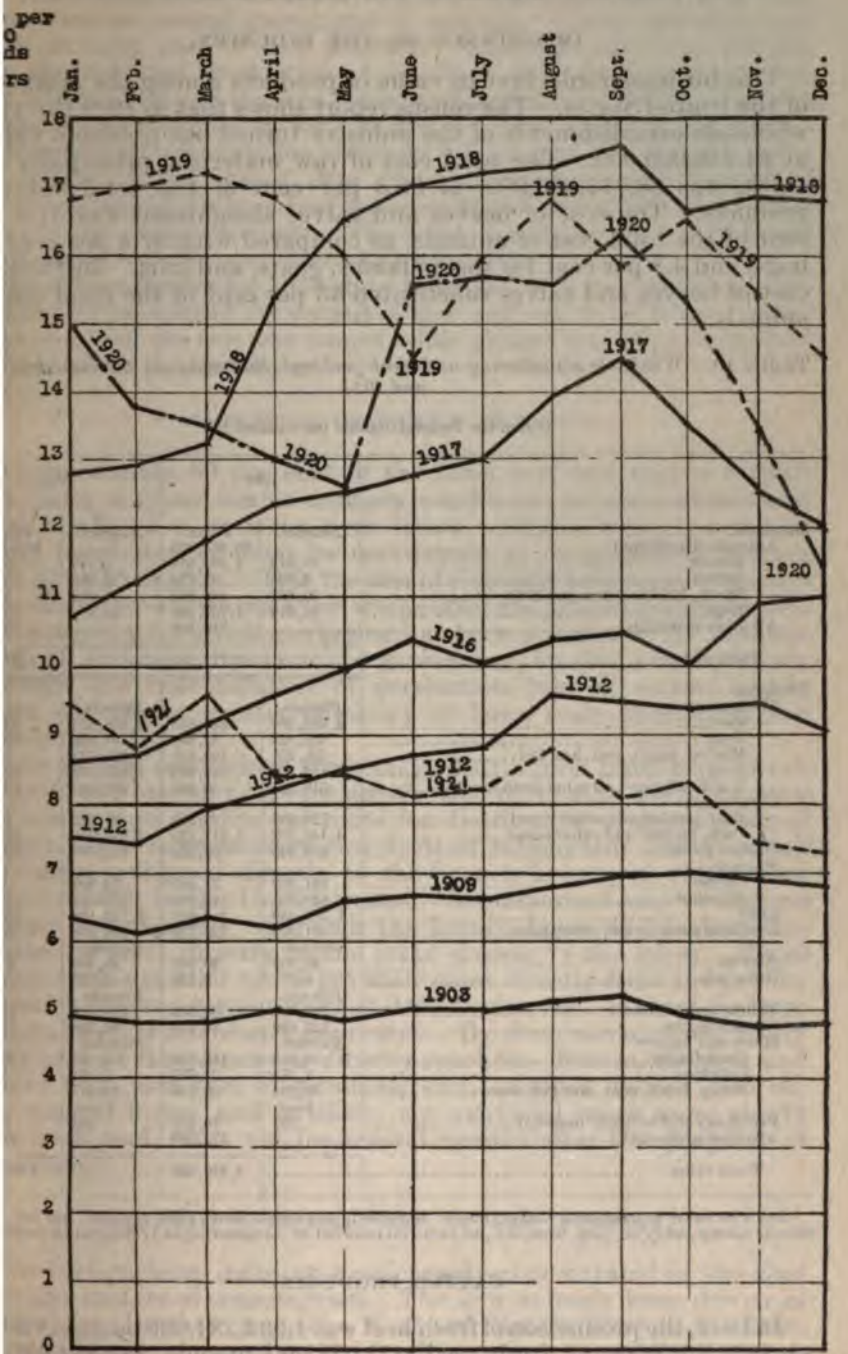

FIG. 5.—Average monthly price of 1,200-1,500 pound native beef steers, Chicago, selected years.

The Beef-Slaughtering and Meat-Packing Industry.

IMPORTANCE OF THE INDUSTRY.

This business ranks first in value of products among the industr of the United States. The census report shows that in 1919 the 1,3 wholesale establishments of the industry turned out products valu at $4,246,000,000. The total cost of raw materials, principally li stock, was $3,775,000,000, or 88.8 per cent of the total value products. The cost of beeves and calves slaughtered was 37.8 p cent of the total cost of animals, as compared with 57.4 per cent f hogs, and 4.8 per cent for sheep, lambs, goats, and kids. In 1914 t cost of beeves and calves constituted 43 per cent of the total cost animals.

TABLE 10.—*Wholesale slaughtering and meat packing—Summary for the industry, 1 and 1914.*

[From the Federal Census; 000 omitted.]

	1919		1914	
Materials:	*Number.*	*Value.*	*Number.*	*Valu*
Animals slaughtered	.....	$3,055,495	.....	$1,19
Beeves	10,818	1,055,319	7,149	49
Calves	4,395	95,720	2,019	2
Sheep, lambs, goats, and kids	13,523	146,965	15,952	8
Hogs	44,519	1,757,491	34,442	36
All other materials	.....	719,406	.....	24
Total cost	.....	3,774,901	.....	1,44
Products:				
Fresh meat—	*Pounds.*		*Pounds.*	
Beef	4,932,284	846,806	3,658,334	42
Veal	422,928	83,884	194,699	2
Mutton, lamb, goat, and kid	501,201	120,451	629,233	7
Pork	2,112,243	532,075	1,877,099	22
Edible offal and all other fresh meat	516,983	59,832	296,667	2
Cured meat—				
Beef, pickled and other cured	129,960	28,360	91,572	1
Pork, pickled and other cured	4,145,232	1,217,420	2,929,310	39
Canned goods	305,943	96,904	160,799	2
Sausage—				
Canned	161,002	27,985	74,004	
All other	629,701	145,601	435,147	3
Lard	1,372,550	415,817	1,119,189	12
Lard compounds, and substitutes	521,122	123,724	396,398	3
	Gallons.		*Gallons.*	
Oleo oil	20,339	30,953	16,502	1
Other oils	6,721	9,153	6,715	
	Pounds.		*Pounds.*	
Tallow and oleo stock	242,084	36,536	209,614	1
Oleomargarine	123,639	36,778	60,388	
Hides and pelts—	*Number.*		*Number.*	
Cattle hides	10,818	185,020	7,159	6
Calfskins	3,353	24,797	1,464	
Sheep, lamb, goat, and kid skins	12,244	33,780	15,917	1
	Tons.		*Tons.*	
Fertilizers and fertilizer material	391	18,315	294	
All other products[1]	.....	172,099	.....	9
Total value	.....	4,246,290	.....	1,65

[1] Includes value of ammonia, butter, butter reworked, condensed milk, glue, glycerin, hog hair, sausage casings, scrapple, soap, wool, etc., and amount received for slaughtering and refrigeration for ot

CATTLE PRODUCTS.

In 1919, the production of fresh beef was 4,932,284,000 pounds, val at $846,806,000; of fresh veal, 422,928,000 pounds, $83,884,000; pickled or other cured beef, 129,960,000 pounds, $28,360,000; *pro*duction of cattle hides and calfskins was valued at $209,817,

ıd of tallow and oleo oil at $67,489,000. Table 10 also shows a large roduction of canned goods, and of sausage. These doubtless consted in large part of beef products; cattle products also entered ıto the reported production of fertilizer, glue, and casings, while eef fats entered into the lard compounds and soaps. Of the reported roduction of "canned goods," beef constitutes about 75 per cent.

Dressed beef accounts for about 55 per cent on the average of the ve weight of the animal, and according to the report for 1920 of ne of the largest packers, beef made up 81 per cent of the total money eceipts for cattle products. The most important by-products are ides, skins, tallow, oleo oil, and oleo stearin.

The census figures for 1919 show that beef and veal sold fresh contituted 95 per cent of the output of beef and veal in all forms; somehat over half the rest was canned, while pickled and other cured beef ccounted for the remainder.

MARKETING OF CATTLE PRODUCTS.

Approximately 90 per cent of the fresh beef and veal is chilled; ery little is frozen under ordinary conditions, because chilled beef ısually sells at a premium over frozen. Chilled meat, however, is ighly perishable; it must be maintained at temperatures ranging rom 32 to 38 degrees. It is the aim of domestic producers to market heir chilled meats within a few weeks after the animal is slaughtered. This necessity for quick marketing has been a factor in the development of extensive marketing organizations by the large packers, although the concentration of production has, of course, largely grown out of the greater efficiency of large scale production and marketing.

Two general methods of fresh meat distribution have been developed, (1) the branch house for distribution of meat in the large cities and towns, and (2) the car route for distribution of meat to small villages. The large packers own fleets of refrigerator cars in which fresh meat is shipped directly to the branch houses, of which there are over 1,200 in the United States. No important city is without at least one of them. Through the branch house the packers distribute the meat directly to the retail dealers in the cities. Retail dealers in the smaller towns get their meat directly from the peddler car which covers a regular route at definite intervals. One of the large packers has over 500 of such car routes. By these two methods nearly every part of the country is directly reached. Frozen, pickled, and canned beef, and beef by-products, such as hides, tallow, oleo oil, oleo stearin, bones, and fertilizer, are marketed much more slowly than fresh beef, often not for several months after the slaughter of the animals.

GEOGRAPHIC DISTRIBUTION OF THE INDUSTRY.

The beef-packing industry was formerly concentrated in the East near the centers of consumption. The live animals were driven or shipped for slaughter from the West and Middle West to the East. With the development of artificial refrigeration, especially of the refrigerator car, which made possible the long-distance shipment of

fresh meat and the economies which the shipment of the meat entailed as compared with the shipment of the live animal, the industry shifted to the great producing sections. In 1914, Illinois, Kansas, Nebraska, Missouri, and Texas produced over 2,000,000,000 pounds of fresh beef, 58 per cent of the national production.

The cattle-slaughtering industry is of two types: (1) The large slaughtering plants located in the important stockyard market centers, such as Chicago, Kansas City, Omaha, East St. Louis, Jersey City, Fort Worth, and St. Paul. The products of these plants enter largely into interstate commerce and are therefore subject to Federal inspection. These plants take care of the bulk of the meat business of the country. In 1920 approximately 70 per cent of the total number of cattle slaughtered were butchered under Federal inspection in the large marketing centers.

(2) The numerous small plants which supply a purely local demand for meat by slaughtering cattle that are produced in the vicinity. These plants are scattered over the country wherever there is a local supply of meat animals and a substantial local demand for meat. Their products are limited to intrastate markets because they do not have Federal inspection. The slaughter of cattle in these plants and on farms makes up somewhat less than one-third of the total. Such small establishments usually have an advantage over the large packer in that they have a shorter haul for their cattle and for their products. But lacking sufficient volume of business they can not afford to utilize the by-products to the extent that the large packer can. The latter employs highly developed processes which permit a virtually complete transformation of raw material to finished or intermediate products. These products in turn are essential ingredients in innumerable further products.

DISTRIBUTION OF THE OWNERSHIP OF THE INDUSTRY.

A report of the Federal Trade Commission on meat packing shows that in this industry there is a high degree of concentration of control under five large concerns. According to the report 81 per cent of the cattle and 74 per cent of the calves slaughtered under Federal inspection in the year ended June 30, 1917, were handled by these five companies. Only one other packer handled as much as 1 per cent. This marked concentration of control is of interest if it be remembered that these companies have large plants in foreign countries. As they control the bulk of the beef output of the surplus-producing countries, the large packers conduct an international business, and therefore they may be in the position of exporters of meat and cattle products to the United States from their foreign plants. Thus reports[27] for 1918 and 1919 show that American firms control approximately two-thirds of the meat exports of Argentina and Uruguay and that they own about 75 per cent of the packing houses built or building in Brazil.[28] Only one of the five American interests is not substantially represented in South America. The large American packers also have extensive producing and distributing interests in Australasia, Canada, and Great Britain.[29]

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[27] U. S. Commerce Report, Mar. 13, 1920, p. 1471.
[28] Interim report on meat, prepared by a subcommittee appointed by the standing committee on trusts, London, November, 1920, p. 12.
[29] *Report of* Federal Trade Commission, The Meat Packing Industry, Pt. I, pp. 186–199.

FOREIGN TRADE OF THE UNITED STATES: CATTLE, BEEF, BEEF FATS, AND COMPETING MEATS AND FATS.

GENERAL REVIEW.

During the thirty-odd years preceding 1908 the United States contributed the bulk of the world exports of beef and of butcher cattle. These products formerly constituted one of the principal items of our export trade. Reference has already been made to the fact that dating from 1907, the rise in beef prices was accompanied by a marked decline in the total domestic production as well as the total and per capita consumption of beef and veal.[30] Notwithstanding this falling off in the domestic demand, the reduction in production between 1907 and 1915 was so great as to cause a progressive decline in the amount available for export, and temporarily to add the United States to the list of countries dependent in some measure upon foreign supplies. An import balance first appeared in 1913. It reached appreciable proportions in 1914, but was greatly reduced in 1915, when the influence of the war began to make itself felt. An export balance reappeared from 1916 to 1919 inclusive, but a small excess of imports again appeared in the fiscal years 1920 and 1921. The disturbed conditions which prevailed in the cattle trade during these two years suggest caution in drawing conclusions from recent changes, but, speaking broadly, the pre-war trend toward a deficiency of beef has been resumed.

Figure 1 (p. IV) is a graphic presentation of the foregoing. Because of the proximity of Canadian and Mexican supplies, and also because of the trade in different classes of cattle and of beef, the United States has maintained both an import and export trade. Figure 1 shows net exports or net imports in the different years. Detailed figures showing changes in American import and export trade in cattle and beef since 1900 are presented in the following table:

[30] See Table 3, p. 9.

TABLE 11.—*Imports and exports of cattle, beef, and competing meats and fats, fiscal years 1900–1921.*

IMPORTS AND EXPORTS OF BEEF AND CATTLE.

[000 omitted.]

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Imports of cattle.....number..	175	145	101	66	16	27	28	31	92	140	196
Exports of cattle.....do....	397	459	397	402	593	568	584	423	349	208	139
Imports of cattle in terms of meat,[1] pounds.....	65,715	54,365	37,877	24,836	6,035	10,242	10,614	11,794	34,590	52,548	73,587
Exports of cattle in terms of meat,[2] pounds.....	238,372	275,531	235,730	241,307	356,045	340,684	350,543	253,831	209,526	124,525	83,658
Imports of beef.....pounds..	100	693	210	271	165	206	270	404	208	191	677
Imports of veal.....do....	236	116	82	84	34	67	33	59	57	9	26
Total.....	336	809	292	355	199	273	303	463	265	200	703
Exports of beef and veal (fresh, cured, canned, or pickled).....pounds..	434,258	461,296	417,921	385,030	414,902	359,246	413,865	361,160	272,427	182,637	127,408
Imports of beef and cattle.....do....	66,051	55,174	28,169	25,191	6,233	10,515	10,917	12,257	34,854	52,748	74,290
Exports of beef and cattle.....do....	672,630	736,827	653,652	626,337	770,947	699,930	764,409	614,990	481,953	307,162	211,034
Net exports.....do....	606,579	681,653	615,482	601,146	764,714	689,415	753,492	602,733	447,099	254,414	136,774

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
Imports of cattle.....number..	183	318	425	872	339	447	374	294	441	575	330
Exports of cattle.....do....	150	106	25	18	5	21	13	18	42	93	146
Imports of cattle in terms of meat,[1] pounds.....	68,616	119,279	159,430	327,035	242,712	201,218	168,159	132,393	198,225	258,898	148,500
Exports of cattle in terms of meat,[2] pounds.....	90,060	63,301	14,828	11,026	2,468	9,579	6,024	8,196	19,055	41,868	65,709
Imports of beef.....pounds..	375	1,020	4,157	175,740	182,823	70,384	14,399	24,782	32,985	33,424	.....
Imports of veal.....do....	7	3	79	2,647	1,690	509	822	918	3,685	9,012	.....
Total.....	382	1,023	4,229	178,387	184,519	70,893	15,221	25,700	36,670	42,436	41,956
Exports of beef and veal (fresh, cured, canned, or pickled).....pounds..	93,619	64,379	40,060	33,125	277,559	320,132	322,767	521,844	485,730	217,111	55,182
Imports of beef and cattle.....do....	68,998	120,302	163,659	505,422	427,232	272,141	183,380	158,053	234,895	301,334	190,456
Exports of beef and cattle.....do....	183,679	127,682	54,888	44,151	280,027	329,712	328,791	530,040	504,786	258,979	120,882
Net imports.....do....	.....	.....	108,771	461,271	147,205	.....	.....	.....	.....	42,355	69,574
Net exports.....do....	114,681	7,380	.....	.....	.....	57,601	145,411	371,947	269,891	.....	.....

[000 omitted.]

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Meats: [3]	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Beef and veal	66,051	55,174	38,169	25,191	6,233	10,515	10,917	12,257	34,854	52,748	74,290
Mutton and lamb	15,348	13,375	10,695	12,240	9,640	7,683	9,753	9,358	9,250	4,388	5,767
Pork	545	389	1,217	4,456	843	1,033	720	577	706	673	925
Other meats	.....	.....	.....	.....	.....	.....	752	3,406	4,052	4,102	5,078
Total	81,944	68,938	50,081	41,887	16,716	19,231	22,142	25,598	48,862	61,911	86,060
Fats: [4]											
Tallow [5]	5,775	7,305	12,045	21,740	2,336	4,306	3,442	2,504	3,876	7,654	5,760
Lard	46	18	133	633	37	68	15	20	28	23	47
Total	5,821	7,323	12,178	22,373	2,373	4,374	3,457	2,524	3,904	7,677	5,807
Total meats and fats	87,765	76,261	62,259	64,260	19,089	23,605	25,599	28,122	52,766	69,588	91,867
Hides: [6]											
Calf and cattle hides	189,848	143,838	179,621	158,256	111,104	151,798	204,292	175,790	149,413	240,740	416,708
Sheepskins	286	248	28,691	43,503	42,986	51,336	59,508	57,584	47,075	49,208	67,055
Total	190,134	144,086	208,312	201,759	154,090	203,134	263,800	233,374	196,488	289,948	483,763

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
Meats: [3]											
Beef and veal	68,998	120,302	163,659	505,422	427,232	272,111	183,380	158,093	234,895	301,334	190,456
Mutton and lamb	2,354	1,088	859	21,671	21,625	29,310	11,083	9,218	11,074	24,340	114,980
Pork	1,293	1,024	1,122	21,353	52,147	3,391	2,669	4,015	10,452	3,369	1,387
Other meats	5,046	5,812	5,303	763	211	47	.....	15	147,648	17,462	26,728
Total	77,691	128,226	170,943	549,209	501,215	304,859	197,132	171,341	404,069	346,505	333,551
Fats: [4]											
Tallow [5]	10,771	12,282	19,399	28,461	37,008	23,811	47,357	116,698	30,194	35,372	25,863
Lard	74	29	41	2,440	5,270	113	203	1,438	3,774	834	28
Total	10,845	12,311	19,440	30,901	42,278	23,924	47,560	118,136	33,968	36,206	25,891
Total meats and fats	88,536	140,537	190,383	580,110	543,493	328,783	244,692	289,477	438,037	382,711	359,442
Hides: [6]											
Calf and cattle hides	219,770	382,992	395,110	407,514	415,867	527,789	467,622	299,294	303,135	545,099	255,611
Sheepskins	55,532	60,490	71,599	70,204	58,939	101,527	96,056	56,156	62,020	101,016	58,422
Pigskins	488	696	493	750	860	941	299	429	457	255	.....
Total	275,790	444,178	467,202	478,468	475,666	630,257	563,977	265,879	335,612	646,370	314,033

[3] Includes imports of live animals converted into terms of meat represented.
[4] Includes fats represented in imports of live animals.
[5] Includes imports of beef and mutton tallow and oleo stearin.
[6] Includes hides represented in imports of live animals.

TABLE 11.—*Imports and exports of cattle, beef, and competing meats and fats, fiscal years 1900–1921*—Continued.

EXPORTS OF MEATS, FATS, AND HIDES.

[000 omitted.]

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Meats: [7]	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Beef and veal	672,630	736,827	653,652	626,337	770,947	699,930	764,409	614,990	481,953	307,162	211,064
Mutton and lamb	5,805	12,608	14,779	13,222	12,518	11,375	6,224	6,237	5,225	4,295	3,770
Pork	883,888	854,360	781,731	551,968	585,905	616,467	732,319	644,145	638,420	527,217	344,844
All other meats	.....	9,799	7,137	5,265	5,562	6,062	7,927	8,001	8,367	8,538	40,491
Total	1,562,323	1,613,594	1,457,299	1,196,792	1,374,932	1,333,834	1,510,879	1,273,373	1,133,965	847,122	600,169
Fats: [8]											
Tallow [9]	268,757	277,171	206,979	190,159	291,272	257,779	361,227	359,188	332,121	251,218	168,974
Lard	663,042	611,893	557,041	490,853	561,455	611,307	742,937	628,142	604,153	529,171	363,034
Total	931,799	889,064	764,020	681,012	852,727	869,086	1,104,164	987,330	936,274	780,389	532,008
Total meats and fats	2,494,122	2,502,658	2,221,319	1,877,804	2,227,659	2,202,920	2,615,043	2,260,703	2,070,239	1,627,511	1,132,177
Hides: [10]											
Cattle hides	41,256	50,195	42,768	47,045	83,167	58,532	60,413	51,356	44,333	30,500	26,487
Sheepskins	94	223	269	133	226	201	107	102	76	51	33
Total	41,350	50,418	43,037	47,178	83,393	58,733	60,520	51,458	44,409	30,551	26,520

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
Meats: [7]											
Beef and veal	183,679	127,682	54,888	44,151	280,027	329,712	328,791	530,040	504,786	258,979	120,882
Mutton and lamb	7,020	9,886	12,751	10,789	5,766	7,644	5,548	2,417	2,819	6,324	9,853
Pork	366,763	480,234	423,193	412,650	606,797	1,001,402	1,040,422	1,296,065	1,964,518	1,156,706	768,270
All other meats	44,730	44,533	34,215	36,102	37,824	30,122	21,547	21,200	31,750	46,165	.....
Total	602,192	662,335	525,047	503,692	930,424	1,368,880	1,396,308	1,849,722	2,503,873	1,468,174	899,005
Fats: [8]											
Tallow [9]	183,234	177,300	132,113	119,563	117,699	138,327	101,501	79,025	107,282	154,665	154,562
Lard	514,180	595,031	564,171	511,025	501,740	461,967	462,872	396,988	742,585	611,293	771,184
Total	697,414	772,331	696,284	630,588	619,439	600,294	564,373	476,013	849,867	765,958	925,746
Total meats and fats	1,299,606	1,434,666	1,221,331	1,134,280	1,549,853	1,969,174	1,960,681	2,325,735	3,353,740	2,234,132	1,824,751

Hides: [b]											
Cattle hides	57,353 91	26,961 113	20,976 140	14,410 114	22,567 35	16,342 39	9,610 44	11,666 6	15,720 12	25,357 44	21,420 61
Sheepskins											
Total	57,444	27,079	21,116	14,524	22,602	16,381	9,654	11,672	15,732	25,401	21,481

[a] Includes exports of live animals converted into terms of meat represented.
[b] Includes fats represented in exports of live animals.
[c] Includes beef and mutton tallow, oleomargarine, oleo oil, and stearin from animal fats.
[d] Includes hides represented in exports of live animals.

It will be noted that total exports of beef, and of the beef equivalent [31] of cattle exported, amounted to 764,409,000 pounds in 1906, or about 10 per cent of the probable domestic production. The bulk of these exports went to Great Britain. Imports, which consisted almost entirely of Mexican cattle, amounted to only 1.5 per cent of the exports. The precipitate decline in domestic production during the next few years left an export total, largely of beef, of only 54,988,000 pounds in 1913, while the import total rose to 163,659,000 pounds, with practically all imports entering as live cattle from Mexico. Owing to the free entry for cattle and beef after October 3, 1913, to the turmoil in Mexico, and to feed shortages in the United States, imports totaled 505,422,000 pounds [32] in 1914, while exports were still further reduced. It should be further noted that instead of the usual preponderance of live cattle, 35 per cent (178,387,000 pounds) of the 1914 imports entered in the form of beef. In 1915 total exports rose to 280,027,000 pounds, with only 1 per cent in the form of live cattle, while total imports declined to 427,232,000 pounds, with an unprecedented amount, 184,519,000 pounds, or 43 per cent, in the form of beef. After 1915, with an excess of domestic production, imports of fresh and cured beef declined precipitately, and from 1916 to 1919, inclusive, the United States went on an average annual export basis to the extent of 211,000,000 pounds, almost entirely of fresh and cured beef. A large part of this net export balance was made possible by imports of live animals from Mexico and particularly from Canada.

The large imports during the first two years of free entry under the tariff act of October 3, 1913, were not entirely due to the removal of the duty. As a matter of fact, domestic prices of beef and cattle were higher in 1913 and 1914 than at any time during the preceding half century. Seasonal factors had greatly accentuated the steady decline in production; several more or less widespread droughts had occurred from 1911 to 1913, and severe frost damage affected the corn crop in 1914; there were relatively short harvests of corn and some other feedstuffs during several years between 1911 and 1915,[33] and prices rose materially. The average weight of beeves slaughtered in 1914 was over 30 pounds per head less than in 1912, and a large part of the sudden increase in imports for 1914 and 1915, particularly of dressed beef, probably resulted from this unusual though temporary shortage in the domestic supply. Subsequent to 1915, the beef equivalent of imports of live cattle formed over 80 per cent of the total imports of beef—a natural consequence of the enormous corn and hay crops normally harvested in the United States. A discussion of the different phases of this varied trade follows.

EXPORTS OF CATTLE.

Of the exported products of the beef and cattle industry, live cattle constituted a large proportion for many decades prior to 1900 and for some years thereafter. It will be noted in Table 11 that the peak was reached in 1904 with exports of 593,409 head. Sixty-five per

[31] That is, cattle in terms of beef according to conversions shown at the foot of Table 11, p. 38. These conversions will be noted, by years, in lines 3 and 4. Totals of beef and beef equivalent of live cattle are shown in lines 9 and 10.

[32] These and foregoing figures do not include beef fats, of which the United States has remained a heavy exporter. (See Table 11, p. 40.)

[33] For conditions in western Kansas see Breeder's Gazette, Nov. 3, 1921, p. 619.

nt of the exports went to the United Kingdom. They were well ished, moderately heavy animals of the type desired for slaughter that market. From 1906 on there was a rapid decline; by 1914 r exports of live cattle to that country had ceased. The same was rtually true of exports to England from all other countries but eland. Live animals were replaced by chilled and frozen beef ipped chiefly from Argentina and Australasia. Between 1913 and 19 our total cattle exports ranged from 5,000 to about 42,000 head, ainly to Canada and Mexico, and nearly all of the shipments to nada consisted of breeding stock, principally dairy cows. In the cal year 1920 exports rose to 93,000 head, mainly southwestern imals shipped into Mexico, partly for slaughter and partly to stock some of the ranches previously denuded of live stock.[34] In 21 the number exported was 146,000 head, most of which went to exico, Cuba, and the West Indies. In the calendar year 1921 ports of cattle amounted to 196,533 head, of which nearly 80 per nt went to Mexico and Cuba, mainly medium to low grade animals r slaughter. About 20 per cent of this export total went to Great itain; nearly all of the cattle were shipped to the latter market ior to June 1, as the emergency tariff act went into effect May 28. Breeding animals of registered strains, sent mainly to South merica, have formed an appreciable item in the relatively small ports of recent years, and this trade, encouraged by the Governent and by cattle breeders' associations, may develop a valuable arket for pure breds. But except for the relatively small shipments breeding stock, and some sales of medium to low grade butcher ock to West Indian customers, the former American export trade beef cattle seems to have virtually ceased, save as Mexico continues draw on southwestern herds until her own ranches are restocked.

EXPORTS OF BEEF AND CATTLE PRODUCTS.

Of beef products,[5] likewise, our exports rapidly declined. In 901, a record year, the total was 434,258,000 pounds, of which resh beef and veal constituted 81 per cent; in 1907 the total was 61,160,000 pounds, of which fresh beef and veal constituted 78 er cent. Over 90 per cent of this export trade went to the United Kingdom, a market which was soon supplied by the rapidly expanded urplus of South America and by Australasia. Thus in the fiscal years 913 and 1914 total exports averaged only 36,500,000 pounds, of hich only about 20 per cent consisted of fresh meat, largely shipped o Panama. Beginning with 1915 the American exports of fresh eef and veal again became an important factor in the European upply, reaching the new record of 370,000,000 pounds in the fiscal ear 1918, when total exports of fresh and prepared beef amounted o 514,341,529 pounds. About 80 per cent went to the United Kingdom. But with postwar readjustment and liquidation, exports f fresh beef as swiftly declined, and for the fiscal year 1921 they were nly 21,084,203 pounds out of a total of 55,182,000 pounds of fresh nd prepared beef.

[34] See Table 1, pp. 89-91, for number and value of cattle exported by years, 1910-1920.
[5] Fresh, canned, pickled, and other cured beef.

From the foregoing it would seem that the smaller and somewhat specialized trade in canned, pickled, and other cured beef has been better maintained than that in fresh beef. Between 1910 and 1914 exports of pickled and other cured beef ranged from 23,000,000 to 40,000,000 pounds; they rose to 54,000,000 in 1918 and reacted to 25,000,000 pounds in the calendar year 1921. Of canned beef, exports ranged between 3,000,000 and 15,000,000 pounds in the period 1910–1914; owing to war exigencies the peak was reached in 1918 with over 97,000,000 pounds, but in 1921 shipments fell to 6,077,000 pounds. The shipments of cured, pickled, and canned beef have been distributed among most of the countries of the world. Great Britain being the largest single customer.

Exports of beef fats, i. e., tallow and its derivatives, oleo oil, and oleo stearin, have also receded. Shipments of tallow declined from nearly 128,000,000 pounds in 1907 to less than 16,000,000 pounds in 1914 and have since been maintained at about this level. Exports of oleo oil were 195,000,000 pounds in 1907; but declined to 139,000,000 pounds in 1911 and to 93,000,000 pounds in 1913. They averaged less than 80,000,000 thereafter until 1921, when exports rose to 128,000,000 pounds.

In hides, the last major product of the cattle industry, the United States has been upon an import basis for many years. For some time it has imported about 35 per cent of its supply. If consumption is maintained at its present rate, there is virtually no prospect of a sufficient domestic production.

IMPORTS OF BEEF AND BEEF PRODUCTS.

During the pre-war period, when exports of fresh beef were large, imports were insignificant. They did not reach 1,000,000 pounds a year until 1912, and resulted chiefly from a border trade with Canada. In 1913 the total import amounted to only 4,229,000 pounds; in 1914 it rose to 178,387,000 pounds, and in 1915 to 184,520,000 pounds, coming chiefly from Argentina and Australasia in response to more or less temporary domestic shortages which resulted from restricted feed supplies. Veal was imported from Canada in 1915 to the amount of only 1,690,000 pounds. Reference has already been made to the fact that the domestic production of veal has been better maintained than that of beef, and to the further fact that veal is chiefly a by-product of the dairy industry. With the return of the United States to an export basis, imports of beef and veal greatly declined, averaging less than 40,000,000 pounds annually during the last six years. Annual domestic exports exceeded them many-fold until 1921.

Of other forms of foreign cattle products, imports have been insignificant, although imports of beef fats, almost exclusively tallow and oleo stearin, have tended to increase. They consist chiefly of inedible fats, such as are rendered from butchers' scraps, and are used for soap making in the United States. There is a small domestic shortage of such fats, although much larger amounts of the better grades of fats are being exported each year.

IMPORTS OF CATTLE—QUARANTINE REGULATIONS.

In the United States, as well as in many other countries, the importation of live cattle is subject to quarantine regulations [36] in order to protect domestic live stock from contagious animal diseases. Except as applied to Canada and Mexico, whence large numbers of cattle are received for slaughter or for grazing or feeding before slaughter, and to which more lenient treatment is accorded, these regulations, in addition to cost of shipping, virtually prohibit entry for slaughter and greatly deter entry of high-priced pure-bred stock from most countries. When cattle from any country are held in quarantine it is at the expense of the owner or importer for feed and care. Although these regulations do not apply to cattle for immediate slaughter, only Canada and Mexico are in a position to profit by the exemption.

Two distinct classes of cattle are recognized in the import returns, as well as in the tariff acts. One class, consisting of breeding stock, forms a relatively unimportant numerical proportion of the receipts. Nearly all of the imports fall in the second group, i. e., animals brought in for slaughter, feeding, or grazing. This class, the meat equivalent of which constitutes the great bulk of the imports of beef and veal, comes exclusively from Canada and Mexico.

Subject to the quarantine regulations, registered animals of a recognized breed brought in by a citizen of this country for breeding purposes have been exempt from duty since 1883 and have been extensively used for improving domestic herds. Between 1910 and 1914 the cattle imported duty free, almost entirely for breeding, numbered about 2,500 head. Great Britain sent approximately

[36] Under the quarantine act of Feb. 2, 1903, the Secretary of Agriculture is authorized to make such regulations and take such measures as he may deem proper to prevent the introduction or dissemination of any contagious, infectious, or communicable disease of animals from a foreign country into the United States. Enforcement of the law lies with the Bureau of Animal Industry, which has fixed the conditions under which cattle may be imported from various countries.

With the exception of imports for immediate slaughter at port of entry which may be imported without quarantine but subject to other regulations of the Bureau of Animal Industry, all cattle imported into the United States from any part of the world, except the countries of North America, Great Britain, Ireland, and the Channel Islands, are subject to a quarantine of not less than 90 days, counting from the date of shipment, i. e., date of clearance of the vessel bringing the animals to the United States. In the case of imports from Great Britain, Ireland, and the Channel Islands the period of quarantine after arrival at the quarantine station is fixed at not less than 30 days. Permits from the Secretary of Agriculture are necessary for importations from any part of the world except Canada and Mexico.

Cattle entering from Canada for breeding purposes and milk production, 6 months old or over, must be inspected and must be accompanied by a certificate signed by a Canadian official veterinarian, stating that, after careful physical examination on the premises, no evidence of tuberculosis or other contagious disease was found, and that no contagious disease has existed in the district where the animals have been kept for a period of 60 days previous to date. Such cattle must also have been properly tuberculin tested within 60 days of date of importation or must be detained in quarantine after arrival and so tested by the inspector of the Bureau of Animal Industry. Cattle imported for grazing and feeding must be inspected and must be accompanied by a certificate signed by a Canadian official veterinarian stating that no contagious disease affecting cattle, except tuberculosis, has existed in the district in which the animals have been kept for 60 days preceding date of importation. Cattle of a dairy or breeding type, unless consigned for immediate slaughter, may be detained in quarantine for such period as the inspector deems necessary, but not less than three days, at expense of the owner or importer, for rigid inspection and the tuberculin test. Cattle imported for slaughter must be inspected.

All cattle imported from Mexico or other countries below the southern cattle quarantine line must be inspected at port of entry and found free from disease. No cattle may be imported for any purpose from a tick-infested into a tick-free area of the United States. Cattle for breeding, milk production, grazing, or feeding can only be imported into a tick-free area when accompanied by a proper affidavit certifying among other things as to their freedom from ticks and contagious, infectious, or communicable disease and freedom from contact with diseased and tick-infested cattle during the previous 60 days, either in their home district or en route. All tick-infested cattle must be accompanied by an affidavit which certifies, among other things, as to freedom from contagious, infectious, or communicable disease other than ticks and freedom from contact with such other cattle during the previous 60 days, either in home district or en route. When not so certified, the cattle must be detained in quarantine at expense of owner or importer for such time as may be necessary to determine eligibility for entry as shown by rigid inspection and tuberculin test if necessary. For greater details of these regulations see Bureau of Animal Industry Order 266, United States Department of Agriculture, effective Sept. 1, 1919, promulgated pursuant to certain acts of Congress embodied in 26 Statutes 414, 32 Statutes 791, and 34 Statutes 1240, and superseding previous regulations on the same subject.

80 per cent of the pre-war imports; and her shipments continued throughout the war, though in greatly diminished numbers. In 1920 they numbered 1,301 head, with an average value of $451. Some breeding stock is also received from Canada. These are mainly dairy animals.

Nearly all of the imports, therefore, consist of animals brought in for immediate or almost immediate slaughter. Table 11 shows that such imports steadily increased after 1907, coincident with the reduction in the cattle herds of the United States and the rapid falling off in the exports of live cattle. Prior to 1914 these imports were almost exclusively low-priced stocker and feeder animals from Mexico.[37] They were generally grazed in the Southwestern States for a considerable time before slaughter. Internal troubles in Mexico were almost entirely responsible for the gain in imports from that country—from 92,000 head in 1908 to 425,000 in the fiscal year 1913. However, with the rapid advance in prices of cattle, Canadian stockmen also began to export more animals to this country, even prior to the passage of the act of 1913.

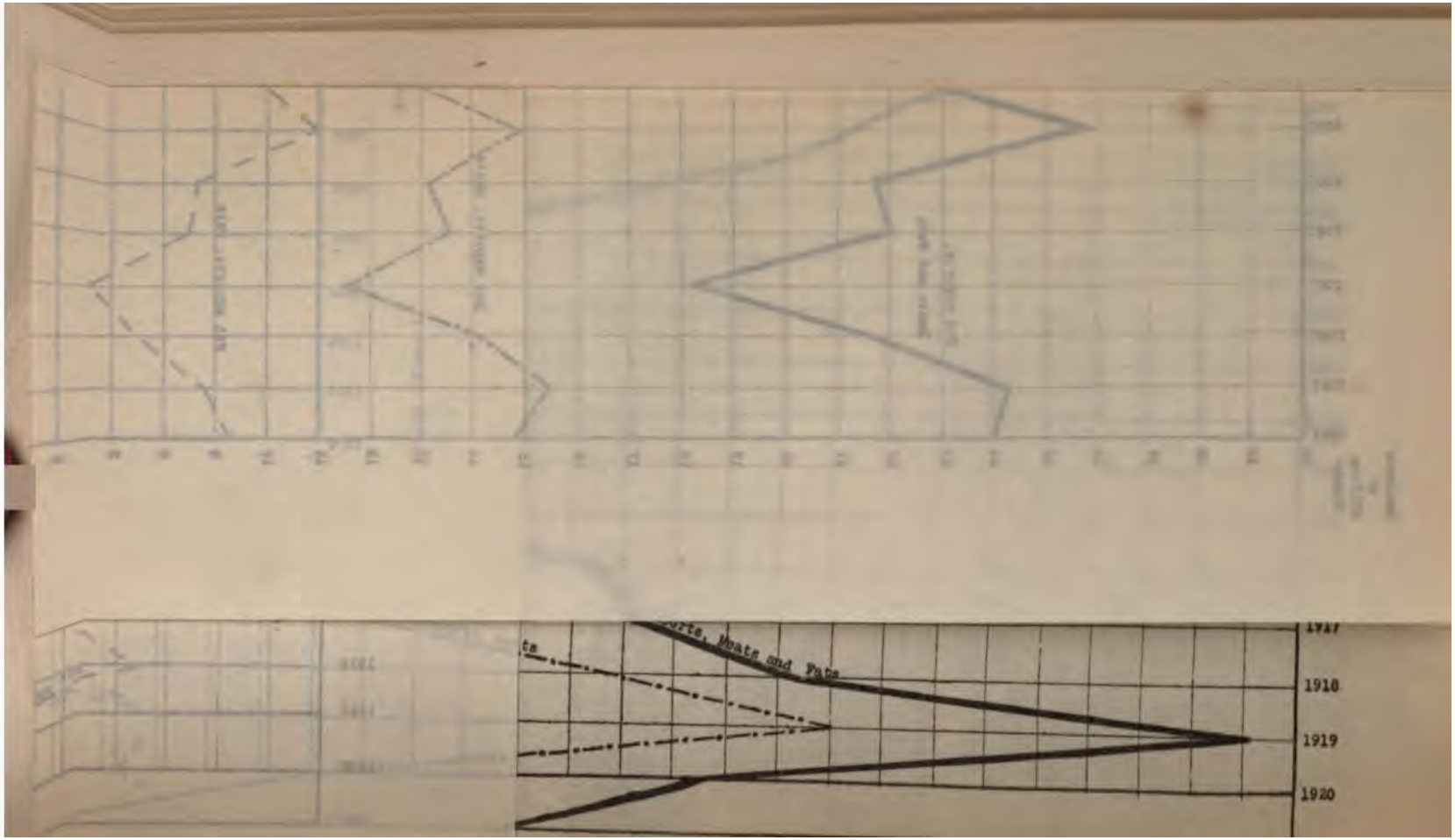
In the fiscal year 1914, favored by free entry under the tariff act of October 3, 1913, a record total of 872,000 live cattle entered the United States; 75 per cent of these came from Mexico. Subsequently, despite the absence of the duty, the imports materially declined, mainly in shipments from Mexico—from 625,253 head in 1914 to 20,184 in 1921. The internal disorders of Mexico and the heavy shipments to the States nearly divested that country of live stock. The imports from Canada, consisting largely of feeder animals,[38] although irregular in volume, on the whole were maintained or increased, until they came to constitute nearly all of the receipts. Canada furnished 70 per cent of our total imports of cattle in 1919, 87 per cent in 1920, and 93 per cent in 1921. The United States market evidently furnished a profitable outlet for the Canadian stockmen, though the heavy receipts in 1919–1921 suggest a considerable degree of liquidation of Canadian war-time increases, rather than a normal importation under conditions of free entry.

IMPORTS AND EXPORTS OF ALL MEATS AND FATS.

In connection with the exports and imports already discussed, Table 11 also presents statistics on the exports and imports of other meats and meat products and fats other than those derived from cattle. Separate statistics are given because during the past 15 years other meats and fats have been, and they are now, an important factor in our export trade. Furthermore, to a considerable extent other meats are interchangeable with beef and affect the prices of that product. This is particularly true in the case of pork.

[37] Of the 421,849 cattle imported in 1913, over 420,000 were dutiable. Of these 93 per cent came from Mexico.

[38] During the calendar year 1919, 40 per cent of the imports came through the Dakota customs district, 23 per cent through Buffalo, 8½ per cent through Arizona, 5 per cent through the St. Lawrence district, and 4 per cent through San Antonio. The average value of the cattle imported at Buffalo was $100, the highest at any port. According to the best estimates available, those imported through Buffalo were largely for cattle for immediate slaughter, while the rest were chiefly feeders and stockers, a few were for breeding purposes, and some were dairy cows. The average value of those coming across the Dakota frontier was $[illegible] and a large majority of these were feeder cattle. It was estimated that 90 per cent of the Canadian animals received at South St. Paul were stockers and feeders, most of the remainder being for immediate slaughter. The low average value of those coming in from Mexico—$29 for Arizona, $32 for San Antonio, and $30 for El Paso—indicates that the animals coming from that source are mainly light cattle for feeding.


Corn, Wheat and Oats
1918
1919
1920

Pork is upon an export basis, and exports of meats other than
f are pork and pork products almost exclusively. It will be
ted in Table 11 that the outward movement of pork declined
m 1907 until 1915, but to a far less extent than that of beef,
ile exports of pork and pork products gained far more than beef
er 1915. From 1916 to 1919 they increased from 1,001,402,000
nds to 1,964,518,000 pounds, and each year marked a new record.
ports of all animal fats, chiefly lard, were continuously higher,
en far above either beef or pork, until 1915, and from 1911 to 1914,
lusive, exceeded those of all meats. Exports of fats declined
m 1915 until 1918 inclusive, largely because of domestic demand
them in the manufacture of explosives, and the loss of the German
rket owing to the war. These details are shown graphically in
ure 6 which shows that net exports of meats and fats declined
til in 1914 fats alone entered into the net export figure; i. e.,
ports of all meats exceeded exports of all meats, leaving only
s as net exports. In other words, the United States had been
adily approaching the point where a duty on meats would have
ded to raise the price in this country. As that point was reached
e duty on live stock and meats was removed.

Table 11 also shows the imports of cattle hides, calfskins, and sheep
d pig skins, including for the first three named those which entered
the live animals. These are presented to show the competition
the principal by-products between the foreign and domestic pro-
cer. Reexports in the form of leather or finished goods are heavy.[39]

Foreign Production.

Foreign countries which compete with domestic producers in sup-
ying our markets with cattle and cattle products fall into three
sses: (1) Those which export principally live cattle for slaughter;
) those which export beef; and (3) those which export breeding
imals. Canada and Mexico are the principal sources of imports
live cattle for slaughter. Argentina, Australia, New Zealand, Can-
da, Uruguay, and to a less extent Brazil, are the most important
urces for exports of beef and cattle products. Great Britain is
e main source for breeding animals. The following brief discus-
n gives data concerning conditions of production in these coun-
es, especially in Canada and Mexico, virtually the only sources of
e cattle available for slaughter in the United States, and in Argen-
a and Australasia, the chief sources of dressed beef.

Table 12 indicates the countries with which the domestic producer
st compete, and shows the number of cattle in the principal beef-
porting countries for a series of years, exports of beef and cattle,
l the exports of beef and cattle to the United States. Exports
beef and cattle from the United States are added to show the
ntrast between our own export decline and the export gains of
principal competing countries. Argentina shows the largest
rease in export trade. No pronounced absolute increase has come

[39] 1920, the total value of exports of cattle and cattle products, including hides, was $95,000,000 as against
orts valued at $243,000,000. But of the imports, hides amounted to $189,000,000 leaving $54,000,000
mports of live cattle and beef products. The total value of exports of cattle and cattle products
r than hides (canned, fresh, and pickled beef, oleo oil, and tallow) in 1920 amounted to $87,000,000 compared
imports of $54,000,000. This excess of exports over imports ($33,000,000) was due mainly to net
rts of fats derived from cattle. (See Table 11, p. 38.) Exports of leather and leather manufactures
ely produced from cattle hides) amounted to $292,000,000 in 1920.

from the other surplus-producing regions. In this connecti
should also be noted that Argentina and Australasia supplied
90 per cent of the world's exports of chilled and frozen beef in
It may be further noted that the increased contributions from ex
ing countries amount to only a fraction of the loss in the
supply caused by the great decrease in the production of the U
States between 1907 and 1914, but that virtually all this Ame
decline was offset by the decrease in domestic consumption.
supplies available for other countries were but little affected.

TABLE 12.—*Cattle and beef industry, by countries.*

Country and year.	Total number of cattle.	Exports.		Exports to the States.[1]	
		Pounds of beef.	Number of cattle.	Pounds of beef.	N
Australia:[2]					
1910	11,744,714	109,427,328	3,745		
1911		108,786,417	9,964		
1912		142,210,076	16,083		
1913	11,483,882	218,918,606	14,605		
1914	11,051,573	292,066,489	10,342	19,858,526	
1915	9,931,316	114,676,104	5,857	10,482,128	
1916	10,467,737	242,081,686	2,977		
1917	11,956,024	180,249,301	1,339	201,641	
1918		[3] 134,388,240		569,053	
1919	11,040,000			719,575	
1920				2,416,978	
New Zealand:[4]					
1906	1,810,936	15,508,600	477		
1907	1,851,750	32,081,500			
1908	1,816,299	35,414,700			
1909	1,773,326	37,339,000			
1910		47,893,000			
1911	2,020,171	50,002,200	371		
1912		21,062,900	379		
1913		26,088,000	273		
1914		32,559,300	401	859,040	
1915		71,628,900	388	1,602,250	
1916	2,417,491	75,093,800	297	5,089	
1917	2,573,230	100,868,900	357	12,949	
1918	2,869,465	88,298,200	402		
1919	3,035,478	80,451,200			
Canada:					
1910	[5] 6,859,000	[6] 1,318,397	157,386	[6] 48,303	
1911	6,333,000	974,411	124,923	1,957	
1912	6,432,000	948,771	61,517	5,711	
1913	6,656,000	1,570,979	44,296	19,474	
1914	6,037,000	13,133,205	218,929	12,637,839	
1915	6,066,000	18,828,257	185,903	17,039,698	
1916	6,594,000	47,422,564	241,560	9,463,072	
1917	7,920,000	45,546,176	166,281	10,039,393	
1918	10,046,000	86,565,100	191,356	12,672,209	
1919	10,085,000	127,810,300	311,496	33,770,300	
1920	9,477,000	110,047,800	518,352	34,619,100	
Argentina:					
1912	[7] 29,124,000	[8] 685,702,000	[8] 261,416		
1913		[8] 732,458,000	[8] 224,911		
1914	25,867,000	[8] 848,471,000	[8] 115,556	132,806,000	
1915		[9] 871,405,000		88,865,000	
1916		1,045,071,000		20,369,000	
1917		1,095,017,000		15,108,000	
1918	27,050,000	1,352,916,000		89,886,000	
1919		971,769,000		19,107,000	
1920				[10] 1,371,890	

[1] In this column are given imports into the United States for fiscal years from countries name
for Canada and Argentina. (See notes 6 and 9.)
[2] Australian Year Book, 1917-18.
[3] Supplement to Commerce Reports 63B, Dec. 2, 1920.
[4] New Zealand Year-book, 1919.
[5] Canadian Year Book and Monthly Bulletin of Agricultural Statistics.
[6] For fiscal years ended March 30, Monthly Report of Trade of Canada.
[7] Year Book, U. S. Department of Agriculture.
[8] Argentine-year Book.
[9] 1914-1917, Anuario del Comercio Exterior de la Republica Argentina: 1917-1919, Boletin M
Estadistica Agricola.
[10] *Fiscal year*, Imports into United States. From Argentina, from Commerce Reports.

TABLE 12.—*Cattle and beef industry, by countries*—Continued.

Country and year.	Total number of cattle.	Exports.		Exports to the United States.	
		Pounds of beef.	Number of cattle.	Pounds of beef.	Number of cattle.
	[11] 8,193,000	[11] 114,335,627	[11] 171,390		
		119,359,910	202,858		
2		135,927,259	143,934		
		134,449,735	65,100		
		129,172,585	77,444		
		165,583,538	87,916		
		177,478,677	33,104	25,902,732	
		226,876,488	25,537	13,802,565	
	7,803,000	166,937,603	84,697	192,229	
		175,031,571	74,786	86,662	
		121,207,806		13,120	
				15,990	
				187,441	
es:					
	61,804,000	127,405,575	139,430		[13] 188,114
		93,618,984	150,100		[13] 177,735
		64,378,658	105,506		[13] 315,187
		40,059,655	24,714		[13] 391,477
	56,592,000	33,125,111	18,376	[12] 57,539,975	[13] 625,253
		277,558,938	5,484	[12] 8,676,776	[13] 346,004
		320,132,447	21,287		[13] 197,788
		322,766,893	13,387		[13] 183,827
		521,844,093	18,213		[13] 105,470
	68,563,000	485,730,477	42,345		[13] 82,340
	68,232,000	217,110,962	93,039		[13] 82,760

) Estadistica Agricola.
rts of beef, in pounds, from United Kingdom.
number of head, from Mexico.

CANADA.

is no sharp natural division between the cattle industry nd south of the international boundary. Both are parts of oduction unit, and important factors that have affected the States have similarly affected the Canadian industry. The n, like the American cattle industry, has felt the pressure of ension of grain growing, and ranges have been cut up by the wire fences of homesteaders. In common with other farm es, cattle raising has been affected by the demand for labor ities in Canada as well as in the United States. Previous to the War the number of beef cattle had failed to keep pace with rease in population. The comparative size of the beef cattle y in the two countries is indicated by the number of cattle. , there were 6,500,000 cattle, other than milch cows, in Canada, t one-seventh of the number in this country. However, ere practically twice as many cattle per 1,000 population [40] da as in the United States.

ods of raising beef cattle in Canada are in many respects to those in the northern part of the United States. Range or ge conditions prevail in the West while the mixed farming is predominant in the East.

ly all of the cattle are kept in two distinct sections, the eastern es of Ontario and Quebec and the prairie Provinces of Alberta, hewan, and Manitoba. In 1919, Ontario had 1,786,000; , 1,213,000; Alberta, 1,247,000; Saskatchewan, 1,006,000;

le 22, p. 82.

and Manitoba, 554,000 cattle. Although the number in the two sections was approximately equal, the population in the eastern Provinces is more than three times that in the prairie Provinces, and in the West there is a much larger surplus of cattle for export.

In the western Provinces there are three general methods of producing beef—the ranching, the semiranching, and the mixed farming systems.[41] Under the ranching system the range is divided into winter and summer grazing areas. The winter range, protected in summer from grazing and fires, is depended upon to carry the unsold stock over the winter. Stocks of native hay are provided against necessity. As in the United States, ranches have been largely cut down by the inroads of settlers who have preempted the watering places and cut up the ranges with barbed-wire fences. Consequently more cattle are being raised under a semiranching system. In the northern part of the prairie Provinces there are large areas of rough, broken land lying near the great wheat sections. These areas are well supplied with water and nutritious grasses. Comparatively large herds are run under fence in the summer, are provided with rough shelters or natural brush or bluff protection during the winter, and are fed oats and barley chop, wheat screenings, wheat and oat straw, and native hay during the cold season. The cattle are shipped off grass in the fall for slaughter or export, or are sometimes moved into the grain districts of the prairie Provinces or eastward for fattening.

The mixed farming system is followed in many parts of Manitoba, Saskatchewan, and in northern and central Alberta. Cattle are being produced in increasing numbers in order to save the prairie farms from rapid deterioration caused by the exclusive production of wheat. In these sections small herds are run on cultivated or native pastures and are given barnyard care in winter. With the rapid settling of the country, large quantities of oats and barley are produced, the value of which is lowered by the heavy freight charges from far inland points. Much of this grain, together with large amounts of roughage produced on the farms, can be economically fed to cattle. However, there is not much winter fattening in western Canada. Nearly all that is done is on general farms.

In central Canada, especially in Ontario, there is considerable raising and fattening of beef cattle. In these general farming sections two systems prevail. One is found in districts where the land is valuable and close to large markets, and is similar to much of the production in the United States east of the range country. Milk is an important product; the cows are milked and the calves are raised largely on skim milk. Where land is cheaper and markets more distant, the calves are run with the cows, which therefore need not be copious milkers. This system parallels that used in more isolated and rougher areas in the eastern and central parts of the United States.

In the East cattle raised on the farms, in a much larger proportion than is the case in the West, are marketed as fat slaughter cattle. The feeding and fattening of stocker and feeder cattle from the western Provinces is also an extensive industry. But the feeding industry does not remotely approach in extent or importance that of our Corn Belt, where the corn crop affords a great advantage. In eastern Canada, ensilage, cut straw, grain chop, clover hay, and pulped roots

[41] Pamphlet 20, Dominion Livestock Branch, Department of Agriculture, Ottawa, August, 1916.

re fed. Oil cake, cottonseed meal, and gluten meal are bought for he final three or four weeks of feeding. Practically all of the oil ake and meal imported comes from the United States.

THE SLAUGHTERING INDUSTRY.

Table 13 compares the slaughtering industry in Canada with that n the United States. The census reports for 1919 show 82 slaughering and meat packing plants in Canada. Twenty-eight were in Ontario and 15 in Quebec. Manitoba had 7, British Columbia 6, and Alberta 7. The value of products of the Canadian plants was about 5½ per cent of that of the total products of the industry in the United States. Canadian production of fresh and cured beef and veal amounted to 350,000,000 pounds or 6.4 per cent of the amount produced in this country.

In the United States in 1920, 12,667,000 cattle and calves were slaughtered under Federal inspection and 9,172,000 otherwise. In comparison, 832,000 were slaughtered under Dominion inspection in the same year. The most important stockyards and slaughtering plants are located at Toronto, Montreal, Winnipeg, and Calgary. In 1920, 44 per cent of the cattle were slaughtered in Ontario, 29 per cent in Quebec, and 13 per cent in Alberta, Saskatchewan, and British Columbia. These figures show the predominance of the East in the slaughtering industry.

As in the United States, there is a tendency toward concentration in ownership of the large slaughtering plants and stockyards of Canada. Several of the large American packing companies have extensive interests there.

TABLE 13.—*Comparison of the wholesale slaughtering and meat packing industries of the United States and Canada, 1919, especially with respect to cattle products.*

	United States.[1]	Canada.[2]		United States.[1]	Canada.[2]
Number of plants	1,305	82	Oleo oil:		
Total cost of all materials	$3,774,901,000	$175,134,000	Gallons	20,339,000	1,791,000
Beeves slaughtered:			Value	$30,953,000	$753,000
Number	10,818,000	694,000	Tallow and oleo stock:		
Cost	$1,055,319,000	$57,558,000	Pounds	242,084,000	14,220,000
Calves slaughtered:			Value	$36,536,000	$2,055,000
Number	4,395,000	200,000	Oleomargarine:		
Cost	$95,720,000	3,711,000	Pounds	123,639,000	10,084,000
Total value of all products	$4,246,290,000	$233,937,000	Value	$36,778,000	$2,655,000
Fresh beef:			Cattle hides:		
Pounds	4,932,284,000	317,468,000	Number	10,818,000	581,000
Value	$846,805,000	$57,582,000	Value	$185,020,000	$9,649,000
Fresh veal:			Calf:		
Pounds	422,928,000	20,310,000	Number	3,353,000	169,000
Value	$83,884,000	$3,698,000	Value	$24,797,000	$1,263,000
Beef, pickled and other cured:					
Pounds	129,960,000	12,105,000			
Value	$28,360,000	$2,203,000			

[1] Preliminary report of the Bureau of Census, Department of Commerce.
[2] Preliminary report of the Dominion Bureau of Statistics.

TRADE IN BEEF AND CATTLE.

Although Canada's proportion of the world beef exports has been relatively unimportant within recent years, she has shipped the great bulk of the cattle imported into the United States. It is only in live

cattle that the Dominion has been a factor in the export trade; at first these were sent to the United Kindom but more recently to the United States. After 1896 the law required that all cattle exported to Great Britain be slaughtered at the port of entry. In spite of this handicap Canadian exports increased until 1906, when 164,000 cattle were shipped. Exports of fat cattle to the United Kingdom, although favored by British preference for home-butchered beef, began to decrease in 1909. On account of shrinkage in weight, freight, difficulty in handling, and risk these exports were more costly than exports of refrigerated meats; furthermore this trade felt the increasing weight of the competition of cheaply produced Argentine and Australian chilled and frozen beef, at the same time that cereal production was making inroads upon the cattle ranges. The decline in exports of cattle reflected the decrease in the number of beef cattle, which fell away from 4,629,000 in 1908 to 3,363,000 in 1914.

The removal of our duty in 1913 gave a powerful stimulus to the Canadian cattle industry. Exports of beef to the United States increased from 19,000 pounds in 1913 to 12,772,000 pounds in 1914, while exports of cattle increased from 28,000 to 206,000 head. This stimulus of open American markets was supplemented in the following years by the war-time demands for beef in Europe and in the United States as well as in Canada. The number of cattle, other than milch cows, increased from 3,363,000 in 1914 to 6,500,000 in 1919. Owing to shipping difficulties between 1915 and 1920 Canadian exports of fat cattle were almost entirely diverted from Great Britain to the United States, while direct exports from Canada to England took the form of beef. Exports of beef to the United Kingdom reached their maximum in 1919, when they amounted to 91,645,000 pounds. The total exports for that year were 125,802,000 pounds. Exports of beef to the United States continued to increase until the fiscal year 1921 (ended Mar. 31) when they amounted to 36,038,000 pounds.

Exports of cattle to the United States reached their maximum in 1920 when they passed the half-million mark. In the fiscal year 1921 they declined to 295,000. The nature of these exports is shown by the official figures of shipments from Canadian stockyards to the United States in the calendar year 1920.[42] Of the total number shipped from all stockyards, 21 per cent were calves, 29 per cent were butcher cattle, 19 per cent stockers, and 31 per cent feeders. Of the shipments from the eastern stockyards of Toronto and Montreal, practically all were butcher cattle or calves, while in the West feeder and stocker shipments predominated; 80 per cent of the cattle shipped from Winnipeg were stockers and feeders. Exclusive of calves, 64 per cent of the shipments from all stockyards were stocker and feeder animals, fattened or finished in the United States before slaughter. In 1921 calves constituted 18 per cent, fat cattle 28 per cent, and stockers and feeders 54 per cent of the shipments reported from Dominion stockyards. Excluding calves, 66 per cent of the total were stockers and feeders.[43]

The natural outlet for Canadian surplus cattle is southward, for feeding and slaughter. This is due to several causes. The extent of the feeding industry in this country and the large quantities of

[42] Annual Report, Dominion Livestock Branch, Department of Agriculture, Ottawa, 1920.
[43] *Ibid.*, 1921.

roughage and grain available for feeding, especially in the Corn Belt, create an active demand for good type feeders similar to those produced in the Canadian Northwest. On the one hand the reduction in the American supply of feeders from the range States has created a demand for the Canadian stock; on the other, in the production of beef, Canada can not compete with the Corn Belt of the United States, or with the year round alfalfa pastures of Argentina. The comparative nearness of St. Paul and Chicago as compared with marketing centers in Ontario and Quebec also favors export to the United States from western Canada, while the cattle feeder in Ontario, under free trade, has as good a market in Buffalo as in Toronto. There is a heavy demand for cattle by-products, in this country, especially for hides and animal fats. There is also a heavy balance of trade in favor of the United States; thus in the fiscal year 1922 our aggregate shipments to Canada amounted to $545,445,000, while exports from that country to the United States were valued at $307,984,000. Exports of Canadian cattle, valued at $41,865,000, were of some importance in keeping down this balance. Such factors contributed to the growth in exports of Canadian cattle to the United States between 1914 and 1921.

Should the southern outlet for the Canadian surplus be definitely cut off, Canadian producers would doubtless look to the United Kingdom, which has been their only other important customer, to take a large proportion of their product. Since the enactment of the emergency tariff act of May 27, 1921, there has been considerable agitation in Canada for the removal of the British embargo on Canadian "store" cattle. It has been estimated that with the removal of the embargo 200,000 such cattle would be exported to Great Britain annually. This, however, was predicated on shipments to the United States during the war years, when production was tremendously stimulated by war prices. The number of beef cattle in Canada virtually doubled between 1914 and 1919. The removal of this stimulus can not but result in large decreases in production both in Canada and the United States, where large increases also occurred during the war years. In both countries the decrease has already made considerable headway.

It should be noted further that exports from Canada to the United States, on the hoof and in other forms, totaled 173,000,000 pounds of beef and veal in 1919, as against only 92,488,900 pounds of fresh and cured beef to the United Kingdom in that year. In 1920 exports to Great Britain were greatly reduced, while total exports to the United States increased much more than those to Great Britain declined. In both years the large exports to this country, chiefly in the form of live cattle, represented, to a considerable extent, a liquidation of war-time increases. Such a decline, of course, means a decrease in the per capita supply of beef cattle, with less surplus for export from Canada, either in the form of beef or of live cattle for slaughter or for fattening; undoubtedly the American duties upon animals and animal products will further contribute to decreased exports. Canada does not possess a pastoral region comparable to that of the arid and semiarid western section of the United States; in her farming region she can not compete with South America and Australasia in the export trade in beef and veal; prior to 1914 her beef cattle industry had steadily declined, just as

had that in the United States. The subsequent increase resulted primarily from war demand, which, in large measure, took the form of a largely increased American demand for feeder cattle.

THE EMERGENCY TARIFF ACT.

It has already been indicated that Canadian production has declined since the armistice. Heavy imports from Canada during and subsequent to 1919 represented, to some extent, a liquidation of war-time increases. Thus the total number of cattle in Canada increased from 6,037,000 in 1914 to 10,085,000 in 1919, and declined to 9,477,000 in 1920, while the total number sold in all Canadian markets declined from over 1,000,000 head in 1919 to 688,000 in 1921.[44] The number of cattle imported into the United States from Canada totaled 249,316 head in the calendar year 1918, but increased to 550,004 in 1919, fell to 316,559 in 1920, and in 1921 totaled only 179,408.[45] In 1921, owing largely to the emergency tariff, exports of more than 33,000 head to Great Britain were reported by the Dominion Department of Agriculture. Only a few hundred found that outlet during the years immediately preceding. Imports into the United States declined sharply after the passage of the emergency tariff act up to the time that the close of the grazing season forced Canadian prices down to a point at which the duty was absorbed by the producer.[46] Most of the 1921 surplus, therefore, was marketed in the United States, but at an export value in line with the seriously depressed world market, which had continued to decline after June 1 as compared with an easement of the decline in the United States after that date.

MEXICO.

Mexico has almost every variety of climate found in the United States. Large sections, especially the interior plateaus and southern mountain valleys, possess climatic and other conditions that are favorable to the raising of live stock. The luxuriant, nourishing Para grass in the uplands of the southern States flourishes the year around. Because of the flies, mosquitoes, and cattle ticks which infest the lowlands, young cattle do better on the high plateaus of Durango, Sonora, Coahuila, and Chihuahua. Transportation rates and facilities are such that under normal conditions cattle can be profitably raised and shipped to the markets of the United States.

The cattle industry in Mexico has suffered great losses in recent years on account of the disturbed state of the country. The census in 1902 showed 5,142,000 cattle, while figures published by the Pan American Union estimate that in 1920 there were only 2,163,000.[47] During the disturbances there was a wholesale stripping of the ranches in some sections; cows, heifers, and all were sold by the ranchmen in order to protect themselves against depredations.

Because of the cattle tick, the carrier of the "Texas" cattle fever, which infests such a large proportion of Mexican cattle, imports other

[44] Annual Report, Dominion Livestock Branch, Department of Agriculture, Ottawa, 1921.
[45] See Table 8, p. 109. See also report of the U. S. Tariff Commission, The Emergency Tariff and its effect on Cattle, Beef, etc., 1922.
[46] See p. 80 ff.
[47] Bulletin of the Pan American Union, May, 1920, p. 554.

than those for immediate slaughter are prohibited by quarantine regulations of the United States, except into regions below the southern cattle quarantine line. In addition to our own quarantine regulations, Mexico levies an export duty. In November, 1920, this duty was 15 pesos ($7.48 at par) per head for cattle up to 3 years of age and 20 pesos ($9.97) per head on those over 3 years. Special export permits must be obtained from the Mexican authorities. Cows are rarely allowed to leave the country under any circumstances.

Since the United States is the principal market for exports from Mexico, imports into the United States reflect the conditions in the Mexican industry fairly well. From 1900 through 1914 Mexico was by far the most important source of cattle imports. The number which crossed the Rio Grande rose from 193,000, valued at $2,708,000, in 1910 to 625,000, valued at $9,745,000, in 1914. This increase was due largely to the unsettled conditions south of the border and also to the removal of our import duty in 1913. Since 1914 imports of cattle from Mexico have declined greatly. In 1919 they numbered 82,340, valued at $2,462,000. So great has been the reduction in the Mexican supply that recently cattle have been shipped to that country from the United States, 26,964 head during 1919, or considerably more than twice as many as in any previous year in the decade. This may indicate an effort to restock some of the Mexican ranches, though most exports have been for slaughter. It will require a number of years for Mexico to reestablish her herds on the 1902 basis. With the restoration of orderly government in that country, Mexican stockmen will find an outlet for their live cattle, particularly thin animals for further finishing. These animals are of poorer quality and are much lower in price than the feeders shipped from Canada. While they would supplement the diminishing domestic supply of feeders from the range States, and afford an additional outlet for the enormous crops of grain and roughage of the United States, they would also compete with the range production of feeders.

ARGENTINA.

GENERAL.

Argentina is by far the largest exporter of beef, particularly of fresh beef. She has reached this position during the last 20 years, partly as a result of the decreasing American beef and cattle surplus and partly because of changes in management which have greatly increased her beef surplus with but little change in the number of cattle.

Up to 1900 sheep and cattle were the chief industries of the country. Sheep were then kept mainly for wool;[48] cattle were maintained on the coarse native grasses, with relatively little thought given to early maturity of beeves and rapid turnover of capital. In fact little of the natural grass land could produce fat cattle in less than five years. In the humid northeastern region, where both cattle and sheep were raised, grain growing has since made rapid progress. To-day, although more sheep are kept in this area than elsewhere, the flocks have greatly decreased. Cattle, however, have almost held their own in competition with grain production. Elsewhere cattle are kept in

[48] See report of U. S. Tariff Commission, Sheep Raising in Argentina with Special Reference to Costs of Production, 1922.

relatively small numbers, since, with local exceptions, in the semiarid regions which lie to the west and south rainfall is too low and grazing too poor, or the climate too severe, for a profitable cattle industry. These regions are devoted primarily to sheep.

In the humid northeast, the present and the future agricultural region,[49] cattle have competed sharply with grain production because of a steady reseeding of native pastures to alfalfa, which effected a change in management whereby earlier readiness for market was secured. Sheep, being less adapted to alfalfa pastures, steadily declined thereafter, but in the number of cattle there was little change after 1908;[50] a decrease in number of cattle in the humid region has been much more than offset by the increase in beef production effected by the change in management which invariably followed the use of alfalfa pastures.

Table 14 shows the number of live stock and the rapid expansion in the grain acreage of Argentina since 1895. The extension of crop area has occurred almost entirely in the northeastern region, as has the more rapid change from natural-grass pastures to alfalfa for cattle production. Relatively little grain is grown outside of central and western Buenos Aires, the eastern half of La Pampa and Cordova, Sante Fe, Entre Rios, and Corrientes. Most of this region is also well adapted to alfalfa. Except locally, throughout this humid area the pastoral industry is intermingled with general farming. The potential production is indicated by the fact that in this region there is still much more land in the coarse native grasses than in grain and alfalfa.

TABLE 14.—*Crops and live stock in Argentina.*

CROPS.

[Area in hectarias[1]; 000 omitted.]

Year.	Wheat.	Corn.	Linseed.	Oats.	Alfalfa.
1895–96	2,260	1,244	387	.....	713
1905–6	5,675	2,177	1,023	72	2,984
1913–14	6,574	4,152	1,779	1,249	6,690
1918–19	6,870	3,340	1,384	1,206	8,073

NUMBER OF LIVE STOCK.

[000 omitted.]

Year.	Cattle.	Sheep.	Hogs.
1895	21,702	74,380	.....
1908	29,117	67,212	1,434
1914	25,867	43,225	2,931
1918	27,053	44,855	3,270

[1] A hectaria contains 2.471 acres, or roughly 2.5 acres.

The change to grain growing in northeastern Argentina has been of two general types. Up to the present time one has permanently decreased the number of animals grazed; the other temporarily restricted live-stock production, but later greatly increased it. Under

[49] Aside from irrigation developments. The humid region extends west and north of the Province of Buenos Aires and comprises Buenos Aires, most of La Pampa, Sante Fe, and Cordova, as well as Entre Rios, Corrientes, and a few subtropical divisions in the extreme north.

[50] The census of 1914 showed 80 per cent of the cattle to be in 5 of the northeastern Provinces. Buenos Aires had 35 per cent of the total.

the first type ranches (estancias) have been sold in blocks of up to about 400 hectarias (approximately 1,000 acres) to farmers (colonists), who have devoted most of their activities to tillage. After a time, particularly on the larger farms, these farmers usually put on cattle, sheep, or both, as a more or less important side line. In many instances, however, these farmers have not completely availed themselves of the farm roughage and pasturage for live stock.

Under the second system of grain production, which has been merely a transition from coarse native grasses to alfalfa, a part of the estancia is turned over to tenant farmers for three to five years of grain growing. At the end of the term the estanciero seeds the cropped area to alfalfa and turns over a new area to the share tenants. After a series of years the entire estancia is seeded to alfalfa, grain production thereafter being only a minor incident or entirely lacking. The carrying capacity is usually two to three times as large as before, and cattle are kept virtually to the exclusion of sheep. Unless the estanciero makes a specialty of stud flocks, sheep are kept only to supply meat needs of the estancia or to utilize more completely such feed as may not be fully grazed by the cattle.

In some sections this method of management has entirely changed the aspect of the country during the last 10 years. Many areas which a decade ago produced large quantities of wheat and other grain now grow almost none. In other words, much of the grain production has been, a part of it yet is, on a shifting area.

The increase in number of cattle after 1895 resulted to a large extent from extension of ranching operations into interior areas, previously rendered somewhat unsafe by Indians, to improvements in transportation, and to water developments which facilitated the keeping of live stock in interior areas, where, owing to peculiar soil conditions, surface water good enough for the use of stock is present in very limited amounts. After 1908 the decline may be attributed primarily to increased grain production, especially locally, in the humid area; except in La Pampa every Province in the northeastern region carried fewer cattle in 1914 than in 1908.

The quality of the cattle, however, rapidly improved. This improvement resulted partly from the entry of American packers in 1907; they introduced the practice of buying cattle on the basis of quality rather than at a flat rate per head irrespective of quality.[51] Furthermore, a rapid growth in the demand for lighter cuts in the English market (the chief Argentine outlet),[52] caused a steady change from the sale of heavy 5 to 6 year old steers to that of animals about 30 to 42 months old. The widespread use of pure breds, imported chiefly from Great Britain, and a more general use of good bulls after 1907, made such a change possible. Shorthorn, Angus, and Hereford cattle, which now rank in the order named, had implanted inherent early maturity in most herds by the time this change in management began. The extension of alfalfa acreage was of equal importance. Although such a change can progress only rather slowly, the average age at which Argentine cattle are slaughtered has probably been lessened by more than one year during the last decade and a half. As the cattle were ready for slaughter a year or more

[51] See also the Journal of the Ministry of Agriculture (London), November, 1921, pp. 692, 693.
[52] See Table 26, p. 124.

earlier, a much larger proportion were on fattening pasture each year, and as a result the output of beef was greatly increased.

This increase in the production of beef is one of the outstanding facts in the development of Argentina. That country has been the world's largest exporter of beef during the last 15 years. Before the erection of a plant by British interests in 1883, which marked her entry into the export trade in fresh beef, only small quantities of "jerked" and salted beef, beef extract, and live cattle were shipped. Development of the fresh-beef trade was relatively slow until shortly after 1900, and as already noted, was greatly accelerated by the entry of American capital in 1907, the period when the great decline in the beef production of the United States began. In 1919 American packers shipped nearly 60 per cent of the total chilled and frozen beef exported from Argentina.[53] The extent of Argentina's beef surplus is indicated by the fact that in 1918 there were 3,263 cattle, almost exclusively beef animals, per 1,000 inhabitants, as compared with 635 in the United States.[54] Table 15 shows the rapid growth in exports of fresh beef from Argentina after 1900. It is contrasted with the equally rapid decline in similar exports from the United States. The sudden increase in exports from the United States after 1914 was a war-time phenomenon which has since disappeared.

TABLE 15.—*Exports of chilled and frozen beef from Argentina and from the United States for the period 1901–1919.*

Year.	From Argentina.[1]	From the United States.[2]	Year.	From Argentina.[1]	From the United States.[2]
	Pounds.	*Pounds.*		*Pounds.*	*Pounds.*
1901	81,000,000	352,000,000	1911	612,000,000	43,000,000
1902	133,000,000	302,000,000	1912	686,000,000	15,000,000
1903	163,000,000	255,000,000	1913	732,000,000	7,000,000
1904	195,000,000	300,000,000	1914	813,000,000	6,000,000
1905	314,000,000	236,000,000	1915	800,000,000	170,000,000
1906	326,000,000	268,000,000	1916	943,000,000	231,000,000
1907	361,000,000	282,000,000	1917	870,000,000	197,000,000
1908	379,000,000	201,000,000	1918	955,000,000	370,000,000
1909	430,000,000	123,000,000	1919	762,000,000	332,000,000
1910	487,000,000	76,000,000			

[1] 1901–1913 from Yearbook, U. S. Department of Agriculture, 1914, p. 383. Converted into pounds, 160 pounds per quarter. 1914–1919, Market Reporter, U. S. Department of Agriculture, May 22, 1920.
[2] Fiscal years.

From 1911 to 1913, inclusive, Argentina contributed 75 per cent of the world's exports of fresh beef, and 44 per cent of the world's exports of all beef and beef fats. Largely because of the effect of abnormal war-time prices in drawing increased supplies from sources which ordinarily are of only small importance, her preponderance was cut down during the war period. From 1914 to 1919, inclusive, she contributed 60 per cent of the fresh beef and 41 per cent of all beef and beef fats figuring in international trade.[55] During the war years as high as 83 per cent went to Great Britain;[56] Argentina has taken the place in the English beef market formerly held by the United States.

[53] See Table 27, p. 125. See also Table 26, p. 123, for exports of beef from Argentina to principal markets.
[54] See Table 22, p. 82. See also Table 19, p. 74, for exports of fresh beef, beef in other forms, and beef fats, from the different exporting countries.
[55] See Table 19, p. 74, for statistical summary of the world trade in beef products and beef fats.
[56] W. Weidel & Co. (Ltd.), Review of the Frozen Meat Trade, 1918, p. 11.

Until 1914, exports from Argentina to the United States were negligible, but during the first year of free trade they amounted to 133,000,000 pounds. The following year they dropped to 89,000,000 pounds, or 10 per cent of the total exported and slightly less than 1 per cent of the total production in that year.[57] Owing to our own return to a net export basis they virtually disappeared in 1916. If conditions in the United States remain favorable, apart from imports of live cattle from Canada and Mexico, this country will probably continue to supply domestic needs, but the export trade will depend primarily on Argentina, Brazil, Uruguay, Paraguay, Australasia, and South Africa. Argentina probably will continue, for a considerable period in the future, to be more important than all the rest combined.

METHODS OF PRODUCTION.

The displacement of sheep by cattle in northeastern Argentina since 1900 may be in part attributed to the fact that the same amount of labor will care for a far larger capital investment in cattle. A good herder will look after about two-thirds as many cattle as sheep. The rapid seeding of the land to alfalfa has been equally important; the close grazing habits of the sheep has proved detrimental, particularly in drought years; hence cattle have virtually displaced sheep on alfalfa land. On the best natural-grass lands in the Province of Buenos Aires,[58] spoken of as "fine-grass camp," sheep have also virtually disappeared. This land is deemed too valuable for anything but cattle; in fact such ranches are used mainly for fattening steers raised in less favored areas.

On the coarser native pastures in western Buenos Aires and in eastern La Pampa, Cordova, and eastward, where cattle and sheep are often run together, the importance of cattle increases directly with the quality of the grazing. On the better lands sheep are kept mainly to consume the coarser growth not relished by cattle.

There are three methods of beef cattle production. One is in dual purpose herds where milk is equally as important as beef, or more so; another is in strictly beef herds maintained in different parts of the country, often under one management; the cattle are bred in one area and finished in another. The third is on farms and small ranches located in the humid region where the cattle are bred and finished on a single ranch. In the first system, which is followed on farms and small estancias in the humid region, some or all of the cows are milked once a day and the calves suckle the remainder of the milk. Milk drawn from the cow is consumed mainly in butter and cheese manufacture, an industry which has had a remarkable growth since the beginning of the war. The system is similar to that used in many parts of the United States; at the present time (1922) it is of only secondary importance in the beef cattle industry of Argentina, but is growing rapidly in the humid region and supplies raw material for virtually all the dairy products produced in the country.

[57] See Table 12, p. 48.

[58] This land, as a rule, lies in the eastern and southeastern part of the Province, where the soil is heavier; alfalfa dies out quickly, probably because of the high water table (level of water in the subsoil), and the length of time water remains on the surface after heavy rains. The surface run-off is very slow. In the true alfalfa sections of central Buenos Aires and westward the surface is underlaid by a thick stratum of sand which absorbs and holds the rainfall. The top soil is sufficiently light to permit the rains to percolate quite freely.

A second method is the maintenance of breeding herds in remote areas, or in poor grazing sections. The young stock is trailed and shipped to other ranches, generally located in or near the Province of Buenos Aires, for further grazing, and are finally finished on fattening "camp." This is a large scale system followed by relatively few large estancieros and cattle companies. It is analogous to the movement in the United States of southwestern and Mexican cattle to the central and northwestern ranges and to parts of the Central West.

Allied to the above method of operation and really differing from it only in size of operations is the maintenance of breeding herds in less favorable localities. Under this system the young stock are retained until about 2 or 2½ years of age, when they are shipped to fattening ranches owned or rented by the estanciero, or sold to others who own or rent such land. This plan is analogous to movement from the Texas Panhandle and central and northern ranges into the Central and Middle West. It probably accounts for more than 40 per cent of the animals slaughtered each year in the Argentine packing plants.

Under this general plan part of the animals brought from breeding areas are run through the winter on alfalfa pasture, and no effort is made to fatten them until spring. Such stock may be held 10 to 12 months, not being sold until late summer or fall. Other cattle placed on the same ranch may be grazed through a part or all the winter on alfalfa pastures or "fine-grass" land, especially saved for that purpose;[59] possibly 5 per cent of the ranchers also feed alfalfa hay or ensilage regularly during the winter to supplement this grazing, particularly on straight alfalfa pastures, and turn off the winter grazed steers at any time from midwinter to early spring. Most of the animals shipped to market during the winter, however, have grazed on good "fine-grass" camp such as prevails in parts of Buenos Aires Province. On such land no hay is necessary, as the grazing stays fairly green during the winter and furnishes a good "bite" for cattle despite occasional severe frosts.[60] Still other cattle brought from breeding areas may be purchased in spring or early summer and pastured for four to eight months. A good "finisher" thus buys and sells steers fairly continuously throughout the year, and if an abundance of hay is available he has about the same number on feed at all seasons. However, few men put up sufficient hay to permit this.

On good alfalfa in favorable years the fattening steers are sometimes turned into knee-length grazing at the rate of two or three per hectaria and kept there for about four to five months before slaughter. Fine-grass land, if previously spared for about six weeks, sometimes carries three or four steers per hectaria during the height of the grazing season—about November 15 to April 15. For about six months on good grazing producers reckon on an average gain of more than a pound per head per day.

The third system is that of breeding and fattening cattle on the same ranch. It is the plan generally followed by estancieros with one or two plants, all located on good land, and by many farmers who run cattle

[59] Many estancieros sow Australian oat grass with their alfalfa for fall and winter grazing after the alfalfa has been cut back by frost.

[60] On alfalfa lands north of Buenos Aires Province much less hay is needed to offset frost damage, which is less severe.

in connection with grain production. With well-bred stock on good pasture, most of the animals are disposed of in slaughtering condition at from 2½ to 3 years of age as compared with 3 to 4 years of age on straight fattening ranches. If alfalfa hay is fed regularly during the winter, there is no difficulty in turning off prime steers at 3 years of age in adverse seasons. Conservative producers usually figure on one cow with her calf (until weaned), or one 2-year-old steer per year per hectaria of fair to good alfalfa. In grazing requirements one calf after weaning, and one yearling, are reckoned as the equivalent of a 2-year-old steer. This method is almost as important in Argentine beef production as the two forms of the second system.

Under all these systems grain feeding is virtually nonexistent, except in the case of pure-bred stock or animals being fitted for the shows. The animals graze the year round in commercial herds. Mention has been made of alfalfa hay for winter feed, but this as yet is the exception and not the rule. Very little hay is put up on other than alfalfa ranches, or on natural grass ranches with a limited area of alfalfa. On straight alfalfa land probably 30 per cent of the producers put up hay and ensilage [61] more or less regularly, but not over half the number do so every year. Probably not over 5 per cent make a regular practice of feeding the hay each year, mainly to cattle being fattened. Both hay and ensilage are used primarily as an insurance against dry years. To maintain the milk flow, some producers, especially those who maintain dual-purpose herds, sow wheat, rye, or oats for winter grazing, but including such winter forage crops on ranches where pedigree stock is an important enterprise, probably not over 3 per cent of the stockmen make use of them. However, these crops are commonly grazed in the winter on grain farms where live stock is run as a more or less important side line. In corn-growing sections, after the ears are "jerked" from the stalk, the stover is highly valued for winter grazing and is regularly rented for that purpose if the farmer keeps no cattle or sheep. On the basis of prices up to the winter of 1921, an acre of corn which made 40 bushels of grain was valued at 2 or more pesos (paper) for winter grazing on the stover.

COST OF PRODUCTION.

The cost of production in cattle raising varies more or less widely among estancias and from year to year. Some cost data were secured in Argentina by a special expert of the Tariff Commission during the summer of 1921. These data are deemed typical for the years 1918 to 1920 and are believed to represent fairly accurately the conditions of production in the Province of Buenos Aires. They are based on estimates made by a number of ranchers and cattle dealers thoroughly familiar with conditions. Although perhaps more nearly representative than returns from a limited number of individual ranches, it must be borne in mind that they are estimated costs. It was impossible to secure detailed figures from individual ranchers. These data, as represented in Table 16, show that over half the total

[61] This ensilage is alfalfa that has been rained on or caught in a heavy dew and which is then put into pit silos—pits dug about a yard deep, 3 to 6 or 8 yards wide, and 15 to 30 yards long. The forage is hauled and dumped from ordinary carts which thus pack the silage, and the whole is then covered with straw or rough hay before it is given a coating of earth. It keeps perfectly for several years. In corn or grain growing sections, both corn and small grain are ensiled for regular or emergency feeding, usually the latter. Cutters are not used in filling pit silos, and tubular silos are nearly unknown except on a few dairy farms.

expenses consist of charges for interest on cattle investment land rental. These interest items were included in the Argen costs because similar items were included in domestic studies m by the United States Department of Agriculture and presented e where in this report.

TABLE 16.—*Estimated cost of producing beef in Buenos Aires Province, Argen 1918–1920.*

[Costs are in paper pesos valued at 42.5 cents American gold at par exchange.]

Item.	Alfalfa ranch: Fattening 4,000 steers.[1]	Fine-grass ranch: Fattening 6,000 steers.[2]	Alf ran Bree and tenin cos
	Pesos.	*Pesos.*	*Pe*
Labor and supervision	[3] 19,640	[4] 19,640	[
Hay and ensilage	[5] 2,400	.....	[
Inoculation at 50 centavos	2,000	3,000	
Machinery, auto, etc	4,000	2,500	
Freight, at 158.36 pesos per car (20 head)	31,058	46,587	
Commission on sales, at 1½ per cent	13,230	19,845	
Land rent, at 6 per cent	[7] 54,000	[8] 81,000	[
Interest, at 6 per cent on cattle	38,400	57,600	[9
Total expenses	164,728	230,172	[
Receipts	[11] 882,000	[12] 1,323,000	[13 2
Cost of cattle	640,000	960,000	
Net receipts	242,000	363,000	
Expenses	164,728	230,172	[
Net profit	77,272	132,828	
Percentage of net profit on cattle investment	12.074	13.836	
Percentage of net profit on total investment, interest and rent excluded from costs	11.018	11.75	
Sale price of steers to packers	225	225	
Cost with interest included, at 6 per cent	205	205	
Profit per head	20	20	
Approximate dressed weight per head.....pounds.	730	730	
Percentage of price charged to hides and offal	29.66	29.66	[
Cost of carcass to packers	158.26	158.26	
	Cents.	*Cents.*	*Ce*
Cost per dressed pound to packers, in United States currency	9.22	9.22	
Average cost per pound ready for export	10.34	10.34	[
Charge for landing on dock, London, chilled beef	3.05	3.05	
Charge for landing on dock, London, frozen beef	2.77	2.77	

[1] 4,000 steers, bought at 160 pesos per head; sold at 225 pesos after 4 to 10 months grazing.
[2] 6,000 steers, bought at 160 pesos per head; sold at 225 pesos after 4 to 10 months grazing.
[3] 1 manager, 1 foreman, 6 herders and laborers.
[4] 1 manager, 1 foreman, and 8 herders and laborers.
[5] 60 hectarias cut twice, at 20 pesos per hectaria per cutting.
[6] Cut 75 hectarias as in note 5.
[7] 3,000 hectarias, at 300 pesos per hectaria.
[8] 3,000 hectarias, at 450 pesos per hectaria.
[9] 4,000 hectarias, at 300 pesos.
[10] 2,000 cows, at 150; 1,500 calves, at 75; 1,470 yearlings, at 130; and 40 bulls at 2,000 pesos; a to 683,500 pesos.
[11] 3,920 head, at 225 pesos.
[12] 5,880 head, at 225 pesos.
[13] 1,100 long 2-year-olds, at 195 pesos, and 250 cows, at 100 pesos.
[14] Expenses prorated to steers in same proportion as steer receipts are to total receipts; i. e., 89.5 cent.
[15] This profit represents an accumulation of about 32 months as against about 7 to 8 months in col 1 and 2.
[16] Dressing percentage about 59 on live weight of approximately 600, 600, and 500 kilograms.
[17] This percentage applies to 1919 market; supplied by one of the largest packers in Argentina.
[18] This figure applies to 1919 costs, supplied as in note 17. Landed cost, New York, but little landed cost at English ports. These costs are believed to apply with approximate fairness to 1920.

Alfalfa fattening.—In column 1 are shown cost data for alf fattening "camp." For a year's output, conservative produ (who put up considerable hay each year) reckon on fattening ab one-third more steers than they have hectarias of good alfalfa.

3,000 hectarias of alfalfa, during 12 months, with 4,000 steers purchased each year at an average of 160 pesos per head, and grazed for a period of about six to eight months, a 2 per cent loss is sustained, and 3,920 are sold during the year. These cattle are cared for by a foreman at 220 pesos per month and six herders and laborers at an average of 100 pesos per month, under the supervision of a manager. These wages include the cost of provisions other than food supplied from the ranch. Little extra labor is hired other than to put up hay and ensilage. On a ranch of this size a good manager takes two cuttings from about 60 hectarias in the season; the task is generally performed by contract labor at about 20 pesos per hectaria per cutting. Freight, and commission for selling, which averages 1½ per cent of gross receipts, constitute nearly 5 per cent of the sale price. Land rent is charged at 6 per cent. Money invested in cattle is charged at 6 per cent for the year on total purchases, but actually costs 8 to 10 per cent for the average period of about seven months during which a given lot of steers are held.

The net profit on cattle investment averaged 12.1 per cent prior to the decline in the market which began about January, 1921. Estancieros state that unless more than 15 per cent is made on cattle investment in good years, operations are severely crippled during the recurrent bad seasons; as 1917 to 1920 was a series of good years, and 6 per cent is deducted from "profit" on cattle investment, the calculated net percentage in Table 16, column 1, conforms to general experience. The inclusion of interest and land rent in costs of course results in a hidden profit to the operator who owns both land and capital, but much of the capital used in cattle fattening is borrowed, and much of the land is rented.

"Fine-grass" fattening.—Column 2 shows corresponding data on first-class "fine-grass" land extensively used for cattle fattening in Buenos Aires Province. It is valued 50 per cent higher than good alfalfa land.[62]

This results from a higher carrying capacity. Conservative ranchers calculate on an average of about two steers per hectaria per year, and a gain of at least 220 pounds per head with six months' grazing. On this class of camp there is virtually no greater labor charge for the larger number of cattle fattened than on the same area of alfalfa; the cattle are watched and fences are maintained just as easily. Moreover, there is no danger of bloat, but stock not accustomed to alfalfa must be carefully watched for a time after being placed on feed. Owing to the saving in regular and contract labor, the net return on cattle investment is slightly larger than the figure shown in column 1. The same is true of net profit on total investment with interest excluded from cost. On both alfalfa and fine-grass fattening ranches, however, the net profit on total investment represents a substantial return, and suggests one reason why estancieros usually display small interest when prospective buyers endeavor to secure improved land in the humid region.

Breeding and fattening.—In column 3 are shown details for a combined breeding and fattening estancia of 4,000 hectarias of good alfalfa land. Such a ranch carries about one breeding cow for every 2 hectarias, and a good manager figures on weaning 75 per cent

[62] 450 pesos per hectaria (about $80 United States gold per acre) as against 300 pesos for good alfalfa land.

of calves. Enough heifer calves are retained to maintain the herd, and annual sales amount to about 1,100 2½ to 3 year old beeves besides about 12½ per cent of old cows. With two cuttings of hay and ensilage per year from 75 hectarias of alfalfa, the stock is well fortified against shortage of grazing. The net profit on cattle investment amounts to 11.4 per cent with well-bred stock; this is a reasonable figure for favorable years. This percentage would be lowered greatly if the animals were indifferently bred and unable to make rapid growth for sale at about 2½ years of age.

The relatively narrow spread in net profit on cattle investment between columns 1 and 3 suggests that in favorable years the rancher who fattens cattle of his own breeding operates on substantially even terms with those who purchase animals from less favored areas. The still narrower spread in net profit on total investment points to the same conclusion. This is the opinion of most estancieros. Moreover, the breeder is less affected by sudden changes in the market; all his credits are book credits until his cattle are sold. The buyer of feeders may easily suffer serious loss because, just as in the United States, he gambles with his purchase money on the future of the cattle market. However, he is more favorably situated than most of his North American competitors, who also must gamble on the price of feed. The experience of Argentine ranchers who paid high prices for cattle in 1920, to be grazed until May (1921), is a case in point. There was a drop of 30 per cent in the price of fat cattle between November, 1920, and the latter half of May, 1921. After putting on a gain of about 100 kilograms (220 pounds) at a cost of nearly 8.75 cents per pound in United States currency, feeders bought for 6.3 cents sold at 5.07 cents instead of 7.24 cents per pound, the average price during the two preceding seasons. Instead of making a profit of two-thirds of a cent on the finished steers, a loss of more than 1 cent per pound live weight was sustained.

In this connection it is of interest to note that with costs figured on the same basis as in Table 16, the average loss sustained by cattle feeders in the United States during 1918–19 and 1919–20 was practically 1 cent per pound live weight on the finished steers.[63] This was largely due to the high price of feed, particularly of corn. In 1920–21 the average loss per pound appears to have been equally as large. During the two preceding years the Argentine grazer made good profits; in 1920–21 he appears to have lost about the same amount per pound as his North American competitor.

Slaughtering and shipping.—Table 16 also shows the estimated cost of butchering Argentine beeves and landing the dressed beef on the dock in London in 1919. On the average the heavier 3-year-old animals cost the packers approximately 225 pesos per head as against 195 pesos for the younger steers. Deducting the credit to hides, tallow, and other by-products, the heavy steers cost 9.22 cents per pound, dressed weight, as against about 9.26 cents for the "handy weights."[64] In 1919 the beef on the hooks in the cooler or freezing chambers, ready for export, cost the packer nearly 10½ cents per pound; transportation to England cost 3.055 cents per pound for chilled and 2.77 cents for the frozen beef. The cost on dock in Eng-

[63] See p. 62.

[64] Based on data supplied by one of the largest packers in Argentina for the year 1919. These figures are believed to apply with approximate fairness to 1920 and the years immediately preceding.

n ports therefore averaged nearly 13½ cents for chilled and slightly er 13 cents for frozen beef. Handling, selling, overhead charges, d profit must be added to these to arrive at wholesale prices in gland. Both Argentina and the United States were on an export sis during 1919, although the cost of Argentine beef landed at New rk would show a wide margin below the wholesale price of medium good native steer beef at that market. But owing to difference in ality, Argentine chilled beef sold in the English market at a sub-ntial discount below North American.[65]

FUTURE OF THE ARGENTINE CATTLE INDUSTRY.

To a considerable degree, the extent and rapidity with which beef oduction in Argentina may expand appears to depend primarily the British market. However, Argentina has a bright future in ttle production, and there is small reason to expect a loss of her minant position in the international trade in beef. No other untry has a comparable area so admirably adapted to the st forage crops and to corn; this, and the yearlong grazing season added factors in Argentine supremacy in the export beef trade. is is of special interest to the North American producer because of low price at which Argentine beef can be landed at New York. is quite probable that the cattle industry in that country will ntinue to expand after the present period of depression is past. is expansion can take place in two ways, (1) on general farms, and through increasing the carrying capacity of the land by continued ding of coarse-grassed native grazing land to alfalfa.

Many farmers who have bought or are buying land in the humid ion of Argentina have been steadily putting on cattle as a side e. The obvious advantages of having a herd of reasonable size on derate to large general farms should be more apparent to new in growers, as live-stock enterprises are more fully developed by ly settlers on farming land in the humid region. Such develop-nt doubtless will be facilitated by the more or less "spotted" racter of the existing grain-growing area. To a large extent, this d is intermingled with grazing properties throughout the humid tion. Object lessons for the benefit of newcomers are thus scat-d all through the region where general farming is practicable and re further sales of ranch lands for grain growing must take place. t is possible that at some future time improvements in farm prac- will give average crop yields comparable to those in the United tes, and that the fuller use of farm roughage and of winter graz- incident to crop production will enable the Argentine grain farm- to produce as much or more beef as a side line than was made the same land seeded to alfalfa, under the pastoral industry.

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rom 1907 to 1911, inclusive, the wholesale price of North American chilled hind quarters in London ged about 12.3 cents per pound, Argentine 8.9 cents. In 1916 and 1917 the price averaged about 22½ as against approximately 21½ cents. This greater gain in the price of Argentine beef was due in part e scarcity of beef and a logical effect on price spreads in order to attract larger supplies, and in part to rnmental control of prices and distribution. A few quotations for North American (Canadian) beef e London market during the late summer and early fall of 1921 show a price cut against Argentine beef out 15 per cent. The price preference for American versus Argentine beef results from a higher quality domestic beef, largely corn fed, as against the strictly grass-fed South American. At the same time h American chilled beef differs from Argentine chilled in that the latter is shipped at almost freezing erature. The same price preference would hold in the domestic market. From January to September, sive, 1921, medium to good steer beef averaged between $14.50 and $15 per 100 pounds at New York, Argentine beef probably could have been landed at two-thirds of that price. But, despite favoring nge and a moderate freight rate to North American ports, imports have been virtually eliminated ifferences in quality and the price preference for domestic beef, and the duty of 2 cents per pound. In , 1921, the freight from Buenos Aires to New York was $2.50 per 100 pounds; from Omaha and Kansas $1.34; and from *Chicago, 96½ cents.*

There is no doubt that this general farm development will do much to maintain Argentine beef production; however, growth can not be rapid. All the land in the humid area is privately owned. It is being sold off in farming lots, but slowly; the present owners make a satisfactory income from more or less extensive pastoral uses and at the same time profit largely from rising land values. The tax on land is almost negligible; hence there is every incentive to hold for further increases in real estate values.

Aside from production on general farms, however, there are chances for increase under the pastoral type of management; probably over 90 per cent of the current production occurs on ranches where crop production is virtually an incident. Many millions of acres admirably adapted to alfalfa have never been plowed. Cattle and sheep are there raised on the coarse native grasses. This land is equally adapted to grain growing, but, for many years to come, on a large part of it grain probably will be grown only to get a stand of alfalfa. With the change to alfalfa, sheep will disappear in favor of cattle. As already indicated many more cattle then will be kept on the same area. There is every reason to believe that the extension of the alfalfa acreage will proceed after the existing period of readjustment is passed. Periodical drought and occasional damage from locusts, which recur at intervals in sufficient numbers to consume nearly all the vegetation in outlying regions, can not greatly hinder either the extension of the crop acreage or that devoted to alfalfa provided the crops prove profitable.

URUGUAY.

Uruguay is the only South American country, other than Argentina, that has as yet exported frozen or chilled beef in large quantities, although Brazil and Paraguay are now entering the field. Geographical position and climate are favorable to the development of the industry in the natural pasture country comprising southern Brazil, Argentina, Paraguay, and Uruguay. The latter country is well watered and is somewhat less subject to droughts than Argentina, but the soil is, for the most part, not so rich as the area in and about Buenos Aires Province, where the bulk of the Argentine cattle is raised or finished for slaughter. Bounded on the south by the River Plate, on which are located most of the important meat-packing establishments (several in Montevideo), Uruguay is well situated to take advantage of her adaptation to live-stock production.

Owing to extensive use of English blood, the quality of Uruguayan cattle is high. There were 7,803,000 head in 1916 and the number per thousand population was 5,546,[86] or more than in any other cattle country of appreciable importance. The surplus for export therefore is relatively large. Methods of production are the same as in the humid region of Argentina, and there appears to be little difference in the cost of production except as a somewhat lower average quality and value curtails somewhat the overhead charges in ranch costs. The area in alfalfa is relatively small, however, and the carrying capacity of the land is somewhat lower than on improved pastures in the humid region of Argentina. In 1914, after the removal of the

[86] See Table 22, p. 82.

ited States duty, 25,900,000 pounds of Uruguayan beef and veal
ne into the United States, but our imports from Uruguay after-
rds diminished as sharply as they did from other South American
ntries. Europe then took the Uruguayan surplus. (See Table 12.)
e recent decline in the world market for beef has had a depressing
ct on the cattle industry, but the natural advantage of the
ntry for beef production doubtless will quickly remedy present
ficulties.

BRAZIL.

Brazil, with vast fair to well grassed and well-watered upland
ges, in the southern or plateau region, is just beginning to develop
cattle industry. The herds undoubtedly will be largely increased
the near future. But under normal market conditions widespread
of improved blood will be necessary before Brazilian beef can
mpete on even terms with that of Argentina. In the main, Bra-
an cattle are of rather primitive type, although in some localities
y are modified by infusions of zebu blood from India, and recently
some English blood. As a class, they are late maturing, and the
nual output of beef is much smaller than the number of cattle
ght suggest. Moreover, much of the surplus of the cattle region,
ich borders on Uruguay, Paraguay, and Bolivia, is needed in other
rts of the country, whence it is shipped in the form of "jerked"
f. Brazilian beef is not of the best quality and under normal condi-
ns of supply and demand, when not cured in the customary primitive
y (a combination of salting and drying), must be exported chiefly
the frozen form for the continental trade. However, the shipping
rcity during the war, and the length of time necessary to move
plies from Australasia as contrasted with South America, resulted
a sudden increase in exports of frozen beef to the continent and
o to England. The pronounced decline in beef prices during 1921
l a serious outbreak of bovine disease seriously curtailed exports,
the cheapness of grades below the best sometimes made them
ost unsalable. The more recent improvements in breeding,
ough use of English blood, appear to have been temporarily halted
the current crisis in the industry, but the natural advantages of
uthern Brazil for cattle production are too great to permit a
manent set back to the industry. However, owing to heavy mor-
lty among cattle of superior breeds imported for the improvement
stock, it will probably be a considerable period before Brazil is able
export much beef of a quality that can compete on a normal
rket with that from Argentina.

PARAGUAY.

Paraguay, which is just entering the export trade in frozen beef,
the same natural advantages as Brazil and is confronted with the
ne problems. The cattle industry has been adversely affected,
wever, by frequent revolutions and by labor troubles on the river
amers which carry beef to the seaboard. Paraguayan herds have
yet been improved to any extent by the infusion of foreign blood,
l it is doubtful whether the country will be in a position to com-
e in the dressed-beef trade for a considerable period.

AUSTRALIA.

As a beef surplus country, Australia is second only to Argentina, though a poor second, as will be noted in Table 12. The land area of Australia is approximately equal to that of continental United States. Thirty-nine per cent of the continent lies in the Tropics. This fact, with its insular location and the absence of high mountain ranges, results in an equable climate and a year-long grazing season similar to its South American competitors. Since 70 per cent of the country receives 20 inches or less of rainfall per year, and more than 40 per cent only 10 inches or less, grazing is by far the most important enterprise. Moreover, it must remain so, as there is relatively little surface run-off from the large drainage basins, and relatively small additions to the stream flow from the eastern mountains. In fact the bulk of the water which does reach stream beds is lost by percolation. There is thus only limited prospect for irrigation developments, and grazing promises to continue the chief industry west of the mountains. Therefore, despite considerable extensions of the area in grain, following the breaking up of large ranches (stations) in the years before the war, the products of the Australian grazing industry, almost entirely beef and hides, mutton and wool, were twice as valuable as other agricultural products. In 1919–20, out of total exports valued at £144,569,324,[97] animal products, consisting almost exclusively of pastoral products, totaled slightly over £80,000,000 in value; grain and vegetable products £37,000,000.

Cattle are distributed about equally between the humid region on the Pacific side and the region west of the coastal range, an area comprising the greater part of the continent, where, except along the coast, the rainfall decreases from 20 inches near the mountains to about 10 inches along the border of Queensland and New South Wales, and where practically the sole agricultural activity is cattle and sheep production. Relative to land area, there are more cattle in the moister coastal regions than sheep, which are better adapted to the sparse grazing of the semiarid interior. Some cattle are also raised along the north and west coasts and in the southeastern part of South Australia. In most of the coastal region and in part of the transmountain country the animals are run in fenced paddocks, but in some areas, especially parts of Queensland and the Northern or Federal Territory, vast unfenced grazing ranges or "stations," sometimes comprising 11,000 square miles, are under lease. The chief difficulty west of the mountains is the lack of water. This is partly met by impounding surface water and by deep artesian wells, but there are vast areas where few such improvements have yet been made. Thus Queensland and the Northern Territory are almost exclusively cattle country north of a line about 100 miles north of the Tropic of Capricorn. South of this line sheep compete sharply with cattle. In the cattle country there is usually an abundance of stock water during the summer or rainy season, November to April, and an abundance of grass which cures on the ground for winter feed. During the winter, however, there is a severe scarcity of water, and a large part of the available feed can not be used.[98] This water

[97] Australian Year Book, 1921, p. 518. [98] The Producer, October, 1921, pp. 5, 6.

scarcity prevents extension of the cattle industry. To what extent winter supplies of water can be enlarged is not yet known. This is the chief producing area for the production of beef for export.

As a rule the cattle disposed of from interior stations are fat enough for slaughter from the natural herbage. When ready for market they are trailed over driveways or "traveling tracks" sometimes as far as 800 miles before they reach railroad shipping points en route to slaughtering centers on the eastern and southern coast. After their slow passage over the well-grassed driveways, the animals generally arrive at shipping points in good condition for slaughter, but the irresponsibility of the railways for damages (under State ownership), which results in rough handling and inadequate feeding and watering facilities, subsequently cause heavy shrinkage and considerable loss of cattle. Large numbers of cattle are bargained for at the stations by cattle traders, and an appreciable percentage each year is trailed east of the mountains to be finished on richer grazing in the humid region; this is more commonly done in seasons of subnormal rainfall. Grain feeding is almost unknown except for valuable breeding stock; in good seasons the ranchers apparently make little provision in the way of dry forage for the drought years, which make serious inroads on the herds. Hereford blood seems to be most popular, though virtually all the British breeds are present in Australia. Shorthorns also are quite numerous. Practically all the dairy cattle, predominantly of dual-purpose type, are kept east of the mountains, mainly in parts of New South Wales and Victoria.

The recurrence of regional or country-wide droughts, such as happened in 1901–2, 1912, 1914–15, and 1919–20, and from which it takes years to recover, constitutes a serious obstacle to more rapid expansion of cattle raising. In 1913 there was a total of 11,484,000 cattle in Australia, or practically the same number as in 1895, before the herds were decimated by the great drought. After the drought which ended in 1915, the total was reduced to 9,931,000. In 1917 it had increased to 11,956,000 head, but declined to 11,040,000 in 1919. In the latter year the number per 1,000 population was 2,216, or nearly four times that in the United States. In fact the country seems to have become stocked practically to capacity by 1917, except as continued breaking up of stations in humid sections for mixed farming finally results in a greater number of cattle being kept on crop refuse and on artificially seeded pastures than are now run on the natural grasses. Adverse legislation during recent years, alleged to originate in an effort of the Labor Party to discriminate against large stations, appears to have introduced an element of uncertainty in the business which may prevent an extension of artificial seeding of pastures in areas where rainfall is sufficient to make such a development practicable on the ranches.

Most of the slaughtering plants are located on the Pacific coast between Adelaide and Townsville, 13 in Queensland alone, though a few plants have been installed in north and west Australia during recent years. Large public sales yards are maintained at the slaughtering centers. There the producer or cattle trader usually disposes of his animals at public auction. After slaughter the beef must be exported in the frozen form because of the long ocean voyage, much of it through tropical seas. Exports in the main have gone to Great

Britain, though appreciable amounts, practically 20,000,000 pounds in 1914 and over 10,000,000 pounds in 1915, came direct to the United States. Somewhat larger quantities of Australian and New Zealand beef, nearly 58,000,000 pounds in 1914, and nearly 9,000,000 pounds in 1915, were reexported to this country from the United Kingdom before war-time demand kept meats at European points. The export of frozen beef and beef products during the past decade is shown in Table 19, page 74.

In 1921 conditions were adverse in Australia, just as in the United States and Argentina. The collapse of the British market resulted largely from extensive Government-owned accumulations of meats, curtailed demand owing to unemployment, and the hot summer with its inhibition on the normal per capita consumption of beef. Then, too, there was a rapid change from shipments of frozen beef to shipments of chilled beef from Argentina. This, in connection with sharp competition between packers, which resulted in overshipments of chilled beef, necessitated the use of expensive refrigerated steamers as cold-storage warehouses at British ports, and the visible supplies forced prices downward at a rate which was disheartening to Australian producers. After a time the outlet for Australasian frozen beef became so restricted, despite low prices—the more desirable chilled product from Argentina sold virtually at frozen prices—and shipping charges absorbed so much of the price, that the freezing works were virtually forced to cease buying beeves in Australasia. Whereas at the beginning of the year prices offered producers for good steers delivered at the plant averaged approximately $7.20 per 100 pounds, at the end of the year they had fallen to $3.60 or less and few were taken even at that price.[69] Soon after the end of the year total charges for slaughtering, freezing, freight (2¾ cents per pound), and landing charges in England amounted to 6 cents per pound on frozen beef, which was selling at 8 cents per pound by the carcass.[70] This left only 2 cents per pound, besides value of hides and offal, to the Australian cattleman, or less than was received during the depression of the nineties. However, wages of station hands were 100 per cent above the pre-war level, railroad freights 60 per cent higher, killing and freezing costs 50 per cent, and ocean freights more than 200 per cent.[71] Attempts on the part of northern producers to market part of their surplus in the south of Australia resulted, on an average, in considerable losses, but a favorable season enabled them to carry over the bulk of their marketable animals until the season of 1922. It is estimated that North Queensland has about 400,000 prime bullocks ready for slaughter during the season of 1922 instead of the normal 200,000.[72] Many of the ranchers therefore have recently failed to breed their cows, and some are killing the new calves as soon as they are born, in order to avoid overstocking and to secure relief from excessive taxation. It is estimated that prices offered for good steers at the close of 1921, $3.60 or less per 100 pounds, were not more than two-thirds of the cost of production.[73]

[69] The Producer, January, 1922, p. 35.
[70] Ibid, April, 1922, pp. 36, 37.
[71] Commerce Reports, Dec. 12, 1921, p. 881.
[72] National Provisioner, Nov. 12, 1921, p. 18; The Producer, January, 1922, p. 35.
[73] The Producer, May, 1922, p. 36.

NEW ZEALAND.

Because of its equable climate, moderate to heavy precipitation, and virtual freedom from drought New Zealand is peculiarly adapted to live-stock production. In most areas there is some vegetation even in the coldest seasons, and the English grasses flourish when native bush and fern are cleared off. It is estimated that tame species of grass are about nine times as productive as the native species, and as it is reckoned that high-priced land can profitably be kept in sod, a larger area is sown to grass than to any other crop. At the beginning of 1918, there were 15,448,000 acres in tame grasses, a larger acreage than in the whole of Australia and Tasmania. In addition, about 16,000,000 acres are still in native grass or tussock, but this is rapidly being eliminated. No expensive housing and hand feeding are necessary except when it is desired to give special care to blooded stock. Most production is on farms which average much smaller than the holdings in Australia. About 74 per cent of them contain less than 320 acres, although there are many large grazing holdings held under Crown grants or lease.

There has been a fairly steady increase in the number of cattle in New Zealand, from 1,257,000 in 1900 to 3,035,000 in 1919. In the latter year there were 2,616 cattle per 1,000 of population, or more than four times the ratio in the United States. Most of the leading British breeds are represented, especially the Shorthorn, Aberdeen-Angus, and Hereford, but a rapid development of the dairy industry during recent years has made inroads upon the purely beef herds. Of the 2,869,000 cattle reported in 1918, 793,000 were dairy cows, but of the beef produced a far larger proportion than these statistics indicate is from surplus animals from dairy herds of the dual-purpose type. In fact, it is stated that most of the beef comes from such herds. Dairying was formerly handicapped by the lack of labor but has recently been stimulated by the successful use of milking machines. This development is sure to have an important effect on the future of the beef-cattle industry, owing to the larger returns per man and per farm and to the necessity for larger returns per acre from the numerous moderate-sized farms.

Since both the north and south islands are relatively narrow and well supplied with railways, the transportation of cattle from farms to slaughtering plants is simple and inexpensive. A number of the slaughtering plants are run on the cooperative plan, and if a producer desires he can have his animals slaughtered on commission and sold abroad for his account under his own name or brand. The freezing and preserving of meat has been the most important industry in New Zealand for many years, but just as from Australia, the risk and time involved in the long voyage across equatorial seas have prevented the shipment of fresh meats in other than the frozen form. Both Australian and New Zealand frozen beef sell at a lower price on the English market than the chilled beef from North America and Argentina. Beef exports from New Zealand during the past decade are shown in Table 19, page 74.

GREAT BRITAIN.

Great Britain has long been the source of pure-bred cattle for New World countries. All of the important beef breeds in America originated in the British Isles. The preeminence of the British strains has resulted from generations of close selection and perseverance in definite systems of breeding for the development and fixation of certain desirable traits characteristic of the different breeds.

In beef production, Great Britain has been a deficiency country for the last century. During the years just prior to the war, approximately 40 per cent of the consumption was imported, Argentine chilled beef taking the place of the former heavy receipts from the United States. The frozen beef from Australasia also went mainly to Great Britain. In 1908, imports into the United Kingdom from Argentina, Uruguay, and Australasia amounted to 464,369,000 pounds, with an additional 201,000,000 pounds of chilled and frozen beef and heavy receipts in the form of live cattle from the United States. In 1914, imports of beef from the former countries had increased to 980,066,000 pounds; but from the United States there were only 6,000,000 pounds, and no receipts from this country in the form of live cattle.

Exclusion of Canadian feeder or store cattle under quarantine regulations, and insistance on slaughter at the point of entry of all live cattle other than feeders from Ireland, whence about half a million head arrive annually for fattening, have been measures directly favorable to the home producers and in line with the British preference for home-killed beef. However, strong agitation for removal of the quarantine on Canadian cattle may result in a large movement of such animals to Great Britain in the near future, particularly if continued free entry into the United States is denied.

For their value in indicating the importance of Great Britain in the meat trade of the world, the following table is presented to show British imports of cattle and beef during the period just prior to the war. Great Britain is by far the leading importer of beef.

TABLE 17.—*Imports into Great Britain: Cattle, their meat equivalent, and dressed beef, 1901–1913.*[1]

[000 omitted.]

Year.	Cattle.	Beef equivalent.	Imports of dressed beef.	Total imports.	Home killed.	Total consumption.	Home grown.
	Number.	*Cwt.*	*Cwt.*	*Cwt.*	*Cwt.*	*Cwt.*	*Per cent.*
1901–1905 (average)	509	3,154	5,051	8,205	15,319	23,524	65
1906–1910 (average)	390	2,525	6,431	8,956	16,048	25,004	64
1911	198	1,294	8,089	9,352	15,737	25,089	63
1912	46	307	8,645	8,974	16,268	25,242	65
1913	12	78	9,901	9,532	16,498	26,030	63

[1] Agricultural Statistics, Great Britain (Board of Agriculture and Fisheries), 1912, pt. 2, p. 230; 1913, pt. 3, p. 285.

From Table 17 it is evident that as imports of cattle from countries other than Ireland declined, imports of dressed beef increased at a slightly greater rate, while home production made slight gains. Per capita consumption declined slightly. In 1913 this consumption amounted to 63.6 pounds of beef, 28.4 pounds of mutton, and 33.9 pounds of pork. During the war years, although the military demand

was very heavy, the number of cattle increased somewhat, and home-killed beef and veal supplied virtually the same proportion (62 per cent) of the total, as previously. Only the year ending May 31, 1919, showed much of a variation from this average,[74] and this may be attributed largely to a sharp falling off in imports of concentrated feedstuffs, during that year.

Table 18 is presented to show total British meat supplies from 1901 to 1913 and the percentage derived from the different exporting countries from 1907 to 1913.

TABLE 18.—*Total meat supplies of Great Britain—Domestic production, imports, and principal countries of origin.*[1]

Year ended May 31—	Total supplies.		Domestic production.			Imports.		
	Quantity (000 omitted).	Per head of population.	Quantity (000 omitted).	Per cent of total supplies.	Per head of population.	Quantity (000 omitted).	Per cent of total supplies.	Per head of population.
	Cwt.	*Pounds.*	*Cwt.*		*Pounds.*	*Cwt.*		*Pounds.*
1901	50,266	136.3	29,330	58.3	79.5	20,936	41.7	56.8
1902	50,335	135.2	29,847	59.3	80.2	20,488	40.7	55.0
1903	48,601	129.4	29,856	61.4	79.5	18,745	38.6	49.9
1904	49,961	132.0	29,366	58.8	77.6	20,595	41.2	54.4
1905	50,638	132.6	29,849	58.9	78.2	20,789	41.1	54.4
1906	51,095	132.6	29,252	57.3	75.9	21,843	42.7	56.7
1907	50,789	130.7	29,424	57.9	75.7	21,365	42.1	55.0
1908	51,570	131.6	30,033	58.2	76.6	21,537	41.8	55.0
1909	51,508	130.3	30,667	59.5	77.6	20,841	40.5	52.7
1910	50,116	125.6	30,602	61.1	76.7	19,514	38.9	48.9
1911	51,259	127.4	29,693	57.9	73.8	21,566	42.1	53.6
1912	53,255	131.3	32,052	60.2	79.0	21,203	39.8	52.3
1913	52,191	127.6	31,087	59.6	76.0	21,104	40.4	51.6

[1] Agricultural Statistics, Great Britain, 1912, pt. 5, pp. 278, 279; 1913, pt. 3, pp. 285, 286.

PERCENTAGE OF IMPORTS FROM PRINCIPAL COUNTRIES.

Imported from—	1907	1908	1909	1910	1911	1912	1913
Australia	4.7	3.9	7.3	12.9	10.7	10.3	15.1
Canada	7.8	7.1	5.9	4.6	4.3	2.5	1.6
New Zealand	11.2	9.8	11.9	13.1	10.3	11.6	10.9
Argentina	19.8	25.3	28.7	32.3	37.8	41.5	38.1
Denmark	9.3	10.8	10.1	10.1	10.7	12.2	11.5
Netherlands	4.1	4.3	4.6	4.4	3.4	3.0	4.3
United States	41.8	36.6	28.6	18.0	19.3	14.7	12.8
Uruguay	.6	1.0	1.5	2.1	1.4	2.2	3.4
Other countries	.7	1.2	1.4	2.5	2.1	2.0	2.3

INTERNATIONAL BEEF TRADE.

In connection with production in the principal exporting countries the total exports and imports in the international beef trade are of interest. Table 19 shows these data by countries. The dominant position of Argentina in the export trade, especially in fresh beef, is again evident. From 1911 to 1913 practically 90 per cent of the world's exports of fresh beef was from Argentina and Australasia. The other 10 per cent was contributed chiefly by Denmark and Holland, in the order named. Exports from the last-named countries are mainly to Great Britain and represent the meat surplus of their dairy herds. The dominant position of Great Britain in the import trade is also shown. That country imported 93 per cent of

[74] Agricultural Statistics, Great Britain, 1919, pt. 3, p. 84; 1920, pt. 3, p. 106.

the total international trade in fresh beef and retained virtually all of it for home consumption. It is interesting to note that exports of other beef—i. e., canned, pickled, salted, and other cured beef, including dried—came chiefly from Uruguay, the United States, and Argentina. The Netherlands, Argentina, the United States, and Australasia contributed the bulk of the beef fats exported.

By 1918, however, war demands and the urge of high prices had greatly increased exports of fresh beef, particularly from countries which had been relatively unimportant from 1911 to 1913. Total exports increased from 1,061,957,000 pounds in the earlier period to 2,216,884,000 pounds in 1918. Argentina and Australasia contributed only 59 per cent of this total, while the United States and Canada, which previously had shipped only trifling amounts, furnished 29 per cent, and Uruguay and Brazil, which previously had not developed an appreciable trade in fresh beef, contributed nearly 11 per cent. Denmark and British South Africa furnished nearly all of the remainder. Exports of canned and other prepared meats had also increased greatly by 1918, and the United States supplied 81 per cent of the total in that year. Exports of beef fats had greatly decreased, and Argentina, the United States, Australasia, and Uruguay, in the order named, furnished nearly all the total.

The second section of Table 19, showing imports of fresh and other beef and of beef fats, indicates a deviation from the exports just discussed. This may be explained primarily by imports by allied military authorities direct for use of the armies. The import figures are, therefore, not comparable with the section on exports.

TABLE 19.—*International trade in beef and beef fats, calendar years 1911–1920.*

EXPORTS.

[000 omitted.]

Exported from—	Average 1911–1913.	1914	1915	1916	1917	1918	1919	1920
Argentina:								
Fresh, frozen, or chilled beef	*Pounds.* 750,971	*Pounds.* 813,427	*Pounds.* 799,694	*Pounds.* 942,908	*Pounds.* 870,457	*Pounds.* 1,092,631	*Pounds.* 883,452	*Pounds.* .....
Other beef [1]	18,265	5,240	470	2,467	16,784	6,127	17,602	.....
Beef fats [2]	171,064	121,142	114,908	113,676	180,439	262,741	214,337	.....
Total	940,300	939,809	915,072	1,039,051	1,067,680	1,361,499	1,115,391	[3]
Australia:								
Fresh, frozen, or chilled beef	156,638	292,066	114,676	242,082	180,249	119,990	121,079	.....
Beef fats	145,244	127,260	32,187	65,463	42,565	101,394	82,390	.....
Total	301,882	419,326	146,863	307,545	222,814	221,384	203,469	[3]
Belgium: Beef fats	1,577	.....	.....	.....	.....	.....	14,863	9,340
Brazil:								
Fresh, frozen, or chilled beef	.....	.....	18,770	74,209	146,500	133,397	113,831	134,255
Other beef	109	305	4,994	15,700	28,405	10,603	12,250	17,382
Beef fats	62	378	.....	1,168	16,258	1,231	20,245	5,008
Total	171	683	23,764	91,077	191,163	145,231	146,326	156,655
British South Africa:								
Fresh, frozen, or chilled beef	239	487	5,986	17,687	47,256	18,656	44,409	12,662
Beef fats	76	412	619	204	203	47	247	135
Total	315	899	6,605	17,891	47,459	18,703	44,656	12,797

[1] "Other beef" includes dried, salted, pickled, canned, etc.
[2] "Beef fats" include stearin tallow, oleo oil, etc.
[3] Reports not available, "All countries," therefore, not complete.

—*International trade in beef and beef fats, calendar years 1911–1920*—Contd.

EXPORTS—Continued.

[000 omitted.]

from—	Average 1911-1913.	1914	1915	1916	1917	1918	1919	1920
rozen, or	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
beef.....	4,640	17,837	29,460	45,837	84,376	126,334	107,170	64,412
ef.....	(4)	(4)	(4)	(4)	(4)	(4)	17	2,616
.....	1,808	1,202	1,235	292	11	361	13,308	1,766
.....	6,448	19,039	30,695	46,129	84,387	126,695	120,495	68,794
fats.....	8,787	18,538	15,151	40,800	36,961	18,762	16,716	(3)
rozen, or								
beef.....	39,520	38,089	50,181	34,220	35,370	21,337	17,730	38,669
ef.....	208	359	15,647	5,999	2,752	9,269	532	.....
.....	3,757	4,952	6,681	1,581	2,230	463	3,981	2,223
.....	43,485	43,400	72,509	41,800	40,352	31,069	22,243	40,892
rozen, or								
beef.....	8,764	5,715	1,626	2,177	2,056	1,547	3,065	12,016
ef.....	342	334	198	274	.....	.....	.....	.....
.....	53,255	36,732	20,466	17,922	5,670	727	5,634	7,824
.....	62,361	42,781	22,290	20,373	7,726	2,274	8,699	19,840
rozen, or								
beef.....	37,857	32,865	45,646	33,382	3,741	53	35,649	6,416
ef.....	.....	.....	.....	.....	2,333	371	1,712	491
.....	288,319	315,853	400,749	370,032	128	16	5,003	15,277
.....	326,176	348,718	446,395	403,414	6,202	440	42,364	22,184
l:								
rozen, or								
beef.....	29,582	69,927	86,477	112,071	99,924	82,308	86,493	84,894
ef.....	976	689	425	311	494	549	478	651
.....	49,985	54,914	59,949	50,338	28,222	36,783	104,997	60,574
.....	80,543	125,530	146,851	162,720	128,640	119,640	191,968	146,319
fats.....	32	72	1,047	.....	.....	.....	.....	.....
rozen, or								
beef.....	15,311	12,280	16,522	7,186	6,149	10	3,693	4,662
ef.....	133	3,993	16,277	3,628	4,366	46	.....	.....
.....	1,841	2,104	2,236	138	452	.....	168	4,296
.....	17,285	18,377	35,035	10,952	10,967	56	3,861	8,958
lom: Beef								
.....	27,595	22,415	19,551	10,790	2,837	1,983	(3)	(3)
s:								
rozen, or								
beef.....	14,886	31,422	262,813	181,977	216,420	514,342	174,427	89,649
ef.....	40,016	54,514	112,747	90,710	133,282	185,663	96,672	49,831
.....	158,820	100,657	159,206	118,755	52,728	92,788	158,333	129,131
.....	213,722	186,593	534,766	391,442	402,430	792,793	429,432	268,611
rozen, or								
beef.....	.....	153,017	215,115	157,568	158,399	106,247	.....	.....
ef.....	86,061	24,462	11,761	9,215	17,151	15,111	.....	.....
.....	33,614	23,498	21,919	12,414	35,216	49,559	.....	.....
.....	119,675	200,977	248,795	179,197	210,766	170,917	(3)	(3)
ies:								
rozen, or								
beef.....	3,549	423	67	441	323	32	5	202
ef.....	136	10	2,398	1,106	2,331	1,969	83	2,257
.....	8,297	7,608	4,015	5,095	1,520	2,988	3,997	2,738
.....	11,982	8,041	6,480	6,642	4,174	4,989	4,085	5,197

ot available, "All countries," therefore, not complete.
combined with "Fresh, frozen, or chilled."

TABLE 19.—*International trade in beef and beef fats, calendar years 1911–1920—C*

EXPORTS—Continued.

[000 omitted.]

Exported from—	Average 1911–1913.	1914	1915	1916	1917	1918	1919	
All countries:[1]								
Fresh, frozen, or chilled beef	*Pounds.* 1,061,957	*Pounds.* 1,467,555	*Pounds.* 1,647,033	*Pounds.* 1,851,745	*Pounds.* 1,851,220	*Pounds.* 2,216,884	*Pounds.* 1,591,093	
Other beef	146,246	89,906	164,917	129,410	207,898	229,708	129,346	
Beef fats	954,133	837,737	859,819	808,668	405,440	569,848	644,219	
Total	2,162,336	2,395,198	2,671,769	2,789,823	2,464,558	3,016,435	2,364,658	

[1] Yearbook figure does not include dried beef.

IMPORTS.

[000 omitted.]

Imported by—	Average 1911–1913.	1914	1915	1916	1917	1918	1919	
Austria-Hungary:								
Fresh, frozen, or chilled beef	*Pounds.* 4,666	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	
Other beef[2]								
Beef fats[3]	8,317							
Total	12,983							
Belgium: Beef fats	6,034						20,367	
Brazil:								
Other than fresh, frozen, or chilled beef	48,093	8,678	4,528	1,724	3,464	2,953	2,099	
Beef fats	896	3,145	12,589	1,817	726	4,828	880	
Total	48,989	11,823	17,117	3,541	4,190	7,781	2,979	
British South Africa:								
Fresh, frozen, or chilled beef	6,481	1,504	35	12	17	4	4	
Beef fats	11,202	9,862	8,632	5,393	1,638	4,727	3,304	
Total	17,683	11,366	8,667	5,405	1,655	4,731	3,308	
Canada:								
Fresh, frozen, or chilled beef	1,549	2,279	1,916	4,228	14,663	2,233	1,403	
Other beef	1,267	1,040	3,580	5,365	3,623	315	368	
Beef fats	275	213	127	190	1,148	6,992	5,418	
Total	3,091	3,532	5,623	9,783	19,434	9,540	7,249	
Cuba:								
Fresh, frozen, or chilled beef	59	136	34	17	65	147	557	
Other beef	32,346	17,063	15,358	30,202	31,308	18,421	31,207	
Beef fats	5,417	10,561	7,263	12,052	8,427	5,779	11,753	
Total	37,822	27,760	22,655	42,271	39,800	24,347	43,517	
France:								
Fresh, frozen, or chilled beef	5,290	33,746	381,614	460,764	414,366	458,494	526,101	
Other beef	80	52	165	225	169	100	6,291	
Beef fats	35,948	37,998	23,001	36,262	43,434	34,166	99,986	
Total	41,318	71,796	404,780	497,251	457,969	492,760	632,378	
Germany:								
Fresh, frozen, or chilled beef	61,865							
Other beef	4,455							
Beef fats	145,830							
Total	212,150							

[1] Complete data from some smaller countries not available.
[2] "Other" beef includes dried, canned, pickled, salted, etc.
[3] *Beef fats* include stearin, tallow, oleo oil, etc.

LE 19.—*International trade in beef and beef fats, calendar years 1911–1920*—Contd.

IMPORTS—Continued.

[000 omitted.]

Imported by—	Average 1911–1913.	1914	1915	1916	1917	1918	1919	1920
and:								
Fresh, frozen, or chilled beef	*Pounds.* 4,214	*Pounds.* 3,479	*Pounds.* 2,309	*Pounds.* 1,058	*Pounds.* 21	*Pounds.* 12	.....	.....
Other beef	6,333	2,714	855	572	2,476	5,375	.....	.....
Beef fats	4,207	3,285	2,300	1,834	1,305	23	.....	2,434
Total	14,754	9,478	5,464	3,464	3,802	5,410	.....	2,434
herlands:								
Fresh, frozen, or chilled beef	3,360	3,768	1,083	85	5	12	35,992	14,901
Other beef	.....	.....	.....	52	47	31	122	143
Beef fats	252,936	199,288	186,014	81,242	23,698	733	41,858	68,976
Total	256,296	203,056	187,097	81,379	23,750	776	77,972	84,020
way:								
Other than fresh, frozen, or chilled beef	36	68	9	8	155	35	.....	.....
Beef fats	20,167	21,030	26,592	30,789	26,219	1,495	20,016	18,748
Total	20,203	21,098	26,601	30,797	26,374	1,530	20,016	18,748
ssia: Beef fats	2,216	693	78	347	.....	.....	.....	.....
in:								
Other beef	.....	.....	80	160	167	81	19	27
Beef fats	966	24	.....	.....	.....	.....	.....	.....
Total	966	24	80	160	167	81	19	27
eden:								
Fresh, frozen, or chilled beef	1,148	453	52	82	291	10,754	.....	.....
Other beef	276	183	23	28	48	1,483	7,091	449
Beef fats	11,488	16,676	19,127	15,767	1,282	23	14,294	9,408
Total	12,912	17,312	19,202	15,877	1,621	12,260	[1] 21,385	9,857
itzerland:								
Fresh, frozen, or chilled beef	5,166	2,109	472	1,276	583	3	126	.....
Beef fats	3,886	2,435	4,518	5,078	3,743	5,975	7,831	.....
Total	9,052	4,544	5,990	6,354	4,326	5,978	7,957	.....
ited Kingdom:								
Fresh, frozen, or chilled beef	903,886	920,980	922,758	772,995	681,796	844,055	721,274	1,026,743
Other beef	69,365	82,576	196,143	182,720	178,260	201,947	295,161	18,259
Beef fats	279,041	299,014	405,007	435,302	319,957	250,339	205,666	212,995
Total	1,252,292	1,302,570	1,523,908	1,391,017	1,180,013	1,296,341	1,222,101	1,257,997
ited States:								
Fresh, frozen, or chilled beef	11,941	254,319	118,590	39,772	22,072	23,339	38,462	50,182
Beef fats	5,727	4,030	1,718	649	5,555	6,952	14,454	15,897
Total	17,668	258,349	120,308	40,421	27,627	30,291	52,916	66,079
her countries: [2]								
Fresh, frozen, or chilled beef	15,688	14,649	11,424	5,585	6,935	11,048	33,898	16,149
Other beef	12,554	7,588	8,362	4,371	18,306	3,128	1,237	580
Beef fats	49,501	48,180	59,787	43,526	23,643	25,208	40,662	18,749
Total	77,743	70,417	79,573	53,482	48,884	39,384	75,797	35,478
l countries:								
Fresh, frozen, or chilled beef	1,025,313	1,237,422	1,440,367	1,285,874	1,140,814	1,350,101	1,357,874	1,547,522
Other beef	174,805	119,962	229,103	225,427	238,023	233,869	343,595	136,111
Beef fats	844,054	656,434	757,673	670,248	460,775	346,240	486,489	482,431
Total	2,044,172	2,013,818	2,427,143	2,181,549	1,839,612	1,930,210	2,187,958	2,166,064

[1] Later figure than in Yearbook.

[2] Does not include imports in Austria-Hungary, Belgium, and Germany during the war period, 1914–8. Therefore the total *trade statistics during* that period are not strictly comparable.

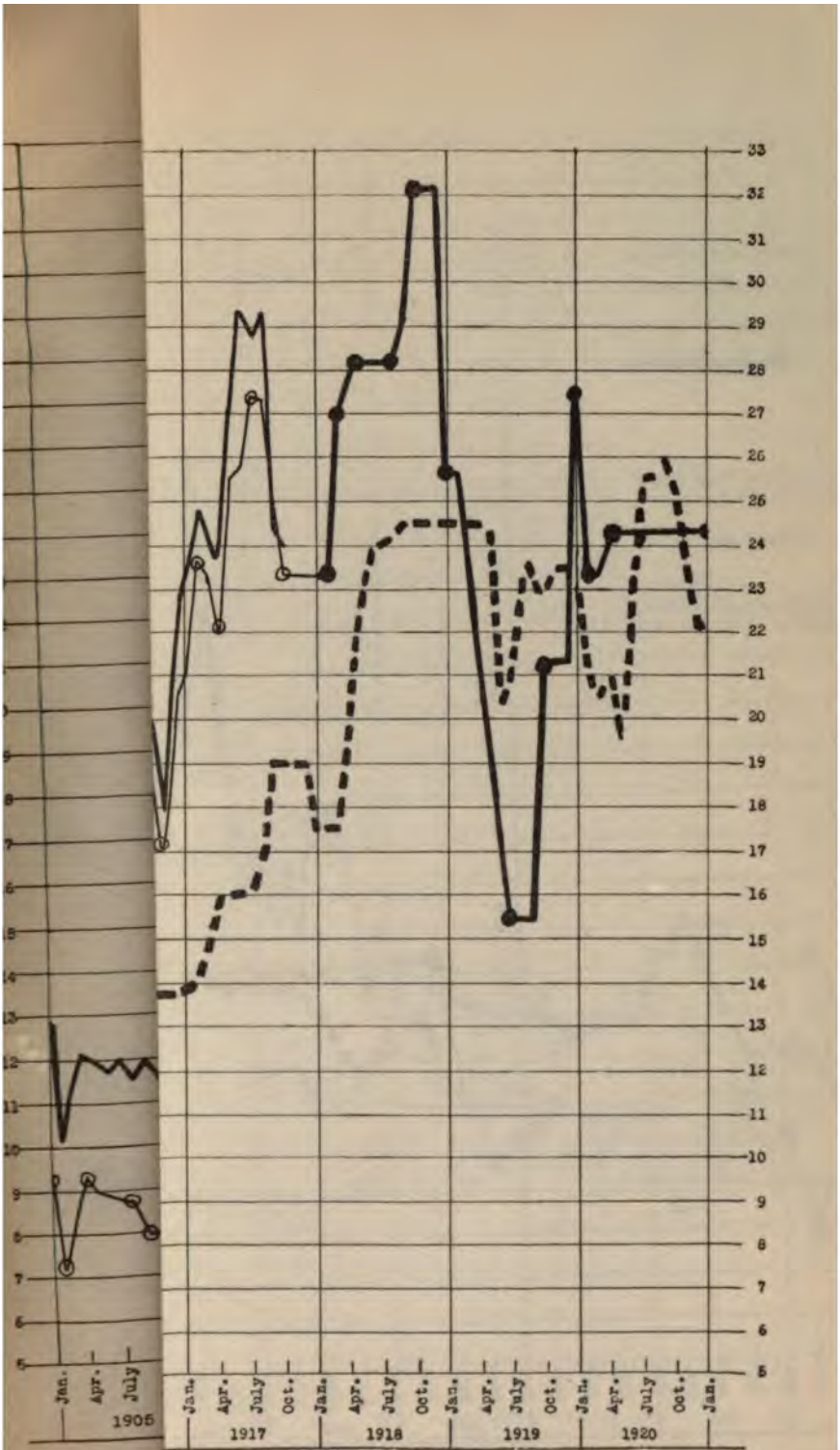
Relation of Domestic to World Prices.

Domestic prices of beef and cattle depend primarily on the w market, which of course varies with import demand, chiefly Great Britain, and export supply, chiefly from Argentina and tralasia during the past 12 years. Seasonal fluctuations in the of beef in the importing countries of western Europe are minim because of the world-wide source of supply, as European imp are drawn primarily from countries such as Argentina, where best grazing occurs during what is the winter season in the Nort Hemisphere. This tendency toward the smoothing out of seas price variations which results from supplemental grazing seaso felt in all exporting countries as well as in importing countries if home producers are not protected from foreign competition. Ex as indirectly affected by pork prices, which continued on an ex basis, withdrawal of the United States from the export beef t tended to give this country a price level which was above the ex level after 1911. The free entry of foreign beef supplies be ning in October, 1913, would of course tend to put domestic p on a distinctly import basis, but the war quickly affected do tic production and exports, and reversed this condition.

Prior to 1912, while the United States was upon an export b American beef met sharp competition in the British market f Argentina and Australasia, but commanded a substantial price mium because of the better quality of domestic corn-fed beef as c pared with the "grass" beef of competitors. The withdrawal of United States from export trade prior to 1913 was not due to lower prices at which competing beef was sold, but to the elim tion of a surplus. Figure 7 shows how Argentina, from 190 1911, was steadily able to undersell the United States in the Lon market. Quotations for United States beef virtually disappe after 1911. As already noted, the difference between prices of Am can and Argentine chilled beef on the London market was a mium which American beef commanded because of its superior qua

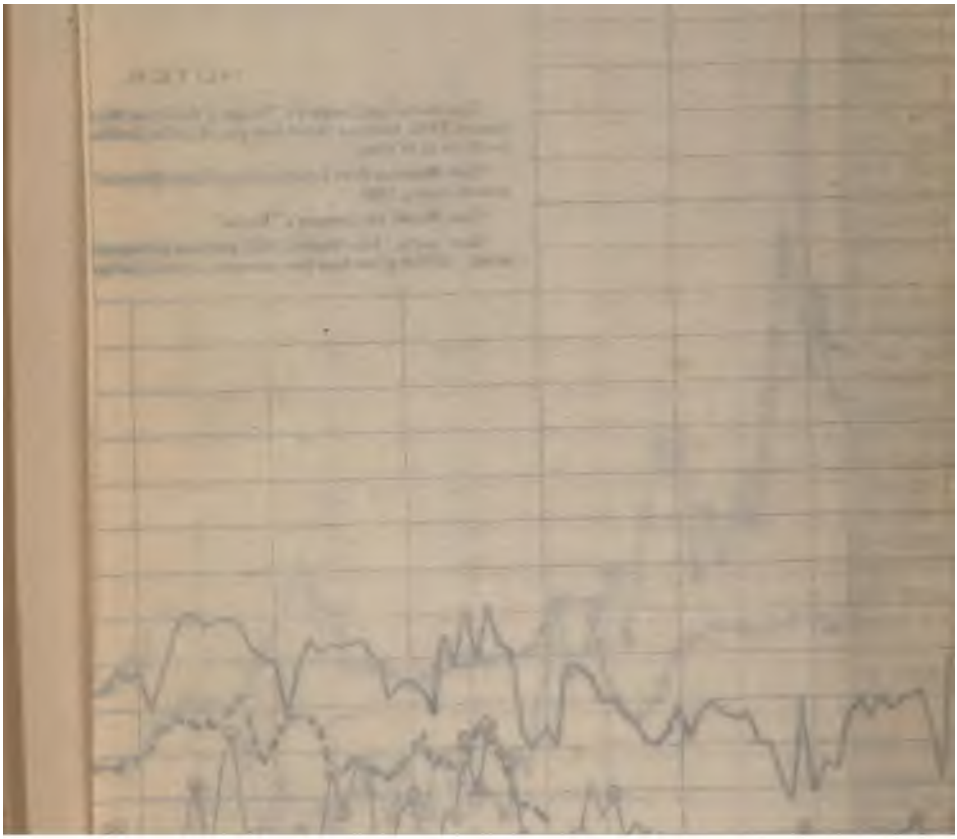
The Relation of Cattle Prices in Canada to Those in the Uni States.

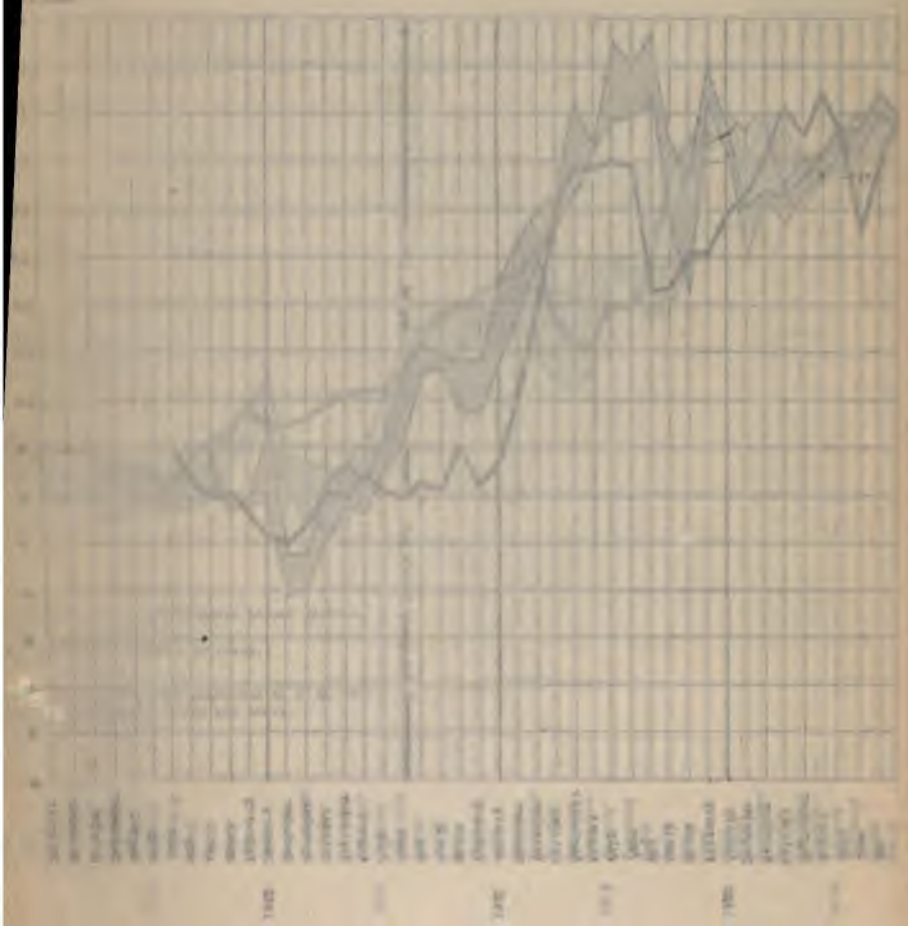
Owing to the intimate relation between beef production in Can and the United States since 1913, it is of interest to compare pr of Canadian and domestic fat cattle. Figure 8 is therefore prese to show the relation between prices in Toronto for butcher st and those in Chicago for fair to choice native beef steers. Toro is the main slaughtering market in Canada, corresponding to Chi in this country. Prior to 1914 there was relatively little impo tion of beef cattle from Canada, and animals shipped from Winn went to Toronto for slaughter or to Ontario for further finis before slaughter. In 1913, while the tariff act of 1909 was in fo the prices at Toronto were considerably lower than at Chic But after November, 1913, Canadian cattle from west of the G Lakes could move to St. Paul and Chicago either for slaughte sale as feeders, or to Toronto or Ontario. Cattle finished in Ont could find an outlet at Buffalo as easily as at Toronto. Inasm as prices in this country had been rising steadily for a numbe

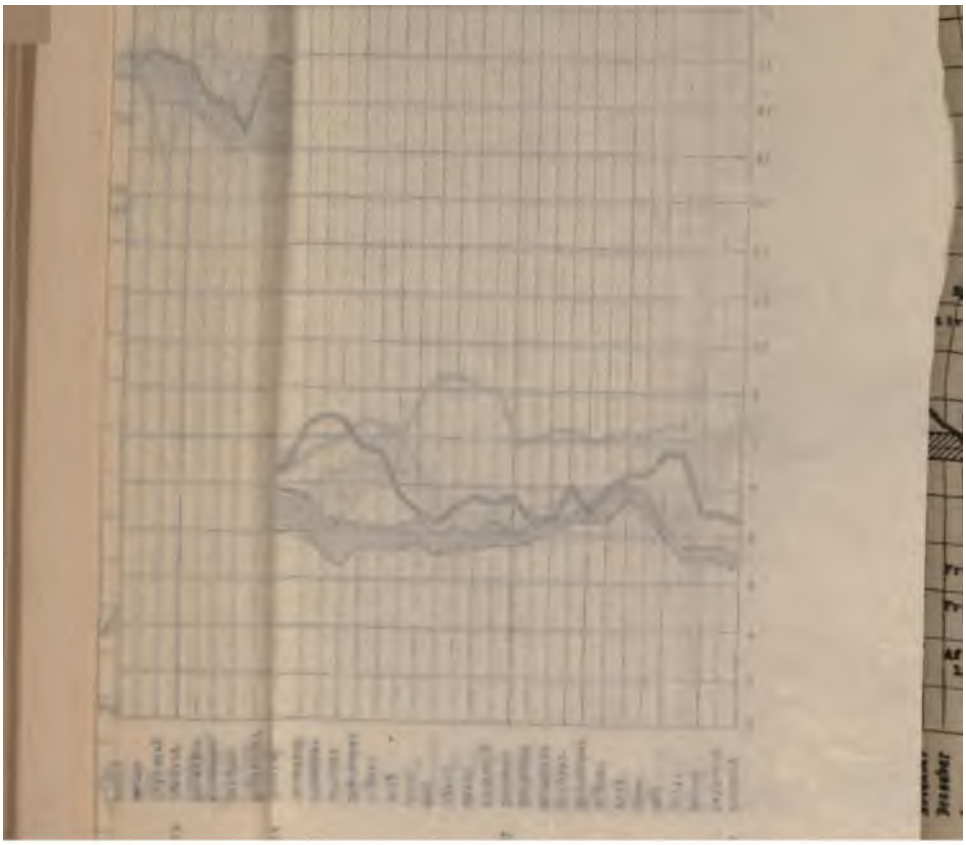


Chicago, 1905–1920.

6303—22. (Face p. 78.)







ɔincident with free entry the diminishing domestic
ıs suddenly curtailed by unusual climatic factors, the
e tariff had relatively little effect on domestic prices.
of the domestic market to Canadian cattle, however,
aised prices in Canada, because that country had con-
:xport basis. Furthermore, the bulk of Canada's sur-
ed in the western Provinces and must pay heavy freight
ıe long shipment eastward. With free entry into the
these western cattle could be shipped to St. Paul and
ıch less cost than to central Canada. The transporta-
in Canada thus cooperated with free entry in bringing
ɔunced rise in the Canadian markets, since, in order
ded supplies, grazers and feeders in central and eastern
ɔ meet the increased prices in western markets. The
market of course was immediately affected. This rise
gure 8. After 1915 the war demand gave each country
et and they shared equally in the subsequent price rise.
ndicates that free entry of cattle into the United States
luable asset to the Canadian producer. His fat cattle
Buffalo for from 50 cents to $1 per 100 pounds below
of domestic animals, because practically all of the
:h that market are finished on grain and have a slightly
g percentage than the Canadian product. Canadian
much less grain and little or no corn—the mainstay of
cattle feeder; the feeder animals are ready sellers, as
:ellent type, easy to handle, are not branded, and make
hen put on feed. They compare favorably with good
he Northern States in this country, and have become
with cattle feeders in the United States. They have
ɔped the St. Paul and Chicago markets. This results
he fact that a considerable proportion of them arrive
lesh that competition between American packers and
keen, since if put on feed they reach prime market
ı relatively short time. In fact, under free entry
cial trade developed for heavy Canadian feeders, fre-
ring and early summer arrivals which can be mark-
ss before the height of the heavy "run" from the
es.

ıtial between domestic and Canadian cattle prices
especially interesting because of the emergency tariff,
7, 1921, and effective May 28. The following table
ıges in differentials before and after June 1. It will
American prices did not rise after June 1, but that
s fell sharply. Canada, with her large surplus, of
d on an export basis; her price levels, therefore, fol-
national level, and Canadian producers had to absorb
er to ship to the United States.

TABLE 20.—*Monthly average prices of cattle, 1921.*

CHICAGO.

[Average price per 100 pounds.]

Month.	Native beef cattle.			Fat cows and heifers.	Canners and cutters.	Stockers and feeders.
	Light, 750 to 1,050.	Medium, 1,050 to 1,200.	Medium to heavy, 1,200 to 1,900.			
January	$7.90	$8.60	$9.67	$6.20	$3.70	$7.2
February	7.50	8.10	8.93	5.85	3.25	6.9
March	8.40	9.10	9.83	6.65	3.65	8.1
April	7.65	7.95	8.50	6.25	3.00	7.4
May	7.75	7.90	8.47	6.05	3.10	7.2
Average	7.84	8.33	9.08	6.20	3.34	7.3
June	7.55	7.75	8.15	5.05	2.20	6.2
July	7.40	7.65	8.28	5.40	2.75	6.7
August	6.90	7.50	9.08	5.10	2.50	5.9
September	6.90	7.30	8.22	4.60	2.75	5.8
October	6.75	7.35	8.48	4.80	2.95	5.6
November	5.90	6.50	7.72	4.80	2.55	5.4
Average	6.90	7.34	8.32	4.96	2.62	5.7

WINNIPEG.

[Average price per 100 pounds.]

Month.	Steers.			Cows and heifers.	Cutters and canners.	Stockers and feeders.
	Heavy finished.	Medium weight.	Light weight.			
	Current.	*Current.*	*Current.*	*Current.*	*Current.*	*Current.*
January	$6.59	$5.66	$5.26	$4.97	$2.81	$4.9
February	6.76	6.76	5.29	4.97	2.61	4.6
March	7.19	6.35	5.85	5.16	2.78	5.3
April	6.88	6.38	5.91	5.14	2.31	5.0
May	6.60	6.44	6.17	5.35	2.51	5.1
Average	6.80	6.32	5.70	5.12	2.60	4.9
June	5.87	5.30	5.06	4.35	1.57	3.8
July	5.04	4.19	3.98	3.76	1.13	2.7
August	4.65	3.66	3.51	3.37	1.18	2.7
September	4.22	3.60	3.34	2.68	1.35	2.8
October	3.92	3.46	3.21	2.81	1.34	2.8
November	3.83	3.49	3.28	2.88	1.53	2.9
Average	4.59	3.95	3.73	3.34	1.35	2.9

TORONTO.

[Average price per 100 pounds.]

January	$8.39	$7.52	$6.74	$6.32	$3.29	
February	8.26	7.23	6.35	5.74	3.13	
March	9.06	7.85	7.26	6.49	2.96	
April	8.83	7.82	7.28	6.62	2.73	
May	8.46	7.60	7.30	6.57	2.64	
Average	8.64	7.60	6.99	6.35	2.95	
June	7.27	6.60	6.34	5.59	1.59	
July	6.55	5.44	5.39	4.52	1.63	
August	6.81	5.78	4.91	4.28	1.50	
September	6.64	5.47	4.83	4.16	1.74	
October	5.98	4.96	4.27	3.83	1.94	
November	5.84	4.65	4.14	3.83	1.87	
Average	6.51	5.48	4.98	4.37	1.71	

Comparison of Chicago and Canadian prices, 1921.

[Average price per 100 pounds.]

Date.	Steers.			Fat cows and heifers.	Cutters and canners.	Stockers and feeders.
	Heavy.	Medium.	Light.			
Chicago, Jan. 1–May 31	$9.08	$8.33	$7.84	$6.20	$3.34	$7.37
Chicago, June 1–Nov. 30	8.32	7.34	6.90	4.96	2.62	5.78
Difference	.76	.99	.94	1.24	.72	1.59
Toronto, Jan. 1–May 31	8.64	7.60	6.99	6.35	2.95	.....
Toronto, June 1–Nov. 30	6.51	5.48	4.98	4.37	1.71	.....
Difference	2.13	2.12	2.01	1.98	1.24	.....
Winnipeg, Jan. 1–May 31	6.80	6.32	5.70	5.12	2.60	4.97
Winnipeg, June 1–Nov. 30	4.59	3.95	3.73	3.34	1.35	2.95
Difference	2.21	2.37	1.97	1.78	1.25	2.02
Difference between Chicago and Toronto, Jan. 1–May 31	.44	.73	.85	.15	.39	.....
Difference between Chicago and Toronto, June 1–Nov. 30	1.81	1.86	1.92	.59	.91	.....
Increase	1.37	1.13	1.07	.44	.52	.....
Difference between Chicago and Winnipeg, Jan. 1–May 31	2.28	2.01	2.14	1.08	.74	2.40
Difference between Chicago and Winnipeg, June 1–Nov. 30	3.73	3.39	3.17	1.62	1.27	2.83
Increase	1.45	1.38	1.03	.54	.53	.43

As illustrating the effect of the emergency tariff on domestic beef prices, which of course control cattle prices, Table 21 is also presented. It will be noted that the price of beef in the United States averaged considerably lower after June 1, but that the price of beef in foreign markets declined still more. In other words, it would seem that, with the United States on a small import basis, the duty held domestic prices substantially above the international level after June 1.

TABLE 21.—*Comparative beef prices, domestic and foreign, 1921.*

[Average price per 100 pounds.]

	Jan. 1 to May 31.	June 1 to Dec. 31.	Decline.	Percentage of decline.
New York, good steer beef	$17.00	$15.61	$1.39	8.2
Toronto, carcass No. 1	19.02	14.65	4.37	23.0
Winnipeg, carcass No. 1	14.22	11.27	2.95	20.7
London, English beef	27.79	19.54	8.25	29.7
London, Argentine chilled hind quarters	17.54	14.81	2.73	15.6
Buenos Aires, frigorifico steer, good	9.70	6.90	2.80	28.9
Buenos Aires, fat steer, frigorifico quality	8.96	6.80	2.16	24.1

COMPETITIVE CONDITIONS IN THE PRODUCTION OF BEEF.

The principal competing countries are grouped below in Table 22 to indicate approximately to what extent they may be competitive at the present time. The actual number of cattle in a given country may not be the best measure of competitive strength. The ratio of

cattle to population is a better measure, provided facilities for slaughtering and refrigeration are available.

TABLE 22.—*Number of cattle and sheep and of cattle units, and ratio to population in the principal competing countries.*[1]

Country.	Population (000 omitted).	Year.	Cattle.		Sheep.		Cattle units per 1,000 population.
			Number (000 omitted).	Per 1,000 of population.	Number (000 omitted).	Per 1,000 of population.	
Argentina	8,284	1918	27,050	3,263	45,000	5,432	4,09
Uruguay	1,407	1916	7,803	5,546	11,473	8,154	6,71
Paraguay	1,000	1915	5,249	5,249	600	600	5,33
Brazil	27,474	1916	[2] 28,962	1,054	7,205	262	1,09
Australia	4,981	1919	11,040	2,216	86,650	17,396	4,78
New Zealand	1,160	1919	3,035	2,616	25,728	22,179	5,78
Canada	8,361	1919	10,085	1,206	3,053	365	1,29
United States	106,871	1919	67,866	635	36,753	344	99

[1] In this table the latest available statistics are used. Dates during the war are taken for some countries. Their competitive status during the rest of the war period was not greatly changed. The total number of all cattle is used because of difficulty in separating dairy from beef cattle, and because dairy cattle make substantial contributions to the beef supply and release large amounts of beef for export.

For comparison, the number of sheep is also included in this table and the number per 1,000 of the population. Sheep and cattle per 1,000 inhabitants are combined into "Cattle units per 1,000 population" on the basis of 7 sheep to 1 cow—i. e., according to the average grazing and feed requirements on farms in the United States. This ratio is a fair basis for estimating meat production.

[2] Includes buffaloes.

It will be seen from this table that Argentina and her two neighbors on the immediate north have an average of 3,750 cattle per 1,000 inhabitants while Australasia has an average of 2,290, as against 635 in the United States. These countries have natural advantages for cattle raising, and their ratio of cattle to inhabitants suggests that in the production of beef they are serious competitors of the United States. Excluding Brazil, whose cattle industry is just beginning to develop, the other competing countries have four times as many cattle per 1,000 inhabitants as has the United States and, with the possible exception of Australasia, probably will increase their herds in the future. They thus present a problem of potential competition which may be much keener than present numbers of cattle indicate.

The present and the potential competition of these countries is greatly heightened by the fact of yearlong grazing, entire absence of grain feeding, and almost total lack of hay feeding in normal years. With relatively few exceptions there is almost no hand feeding of any kind. Periodical droughts, particularly in Argentina and Australia, make inroads on the herds and add to costs of production, but, aside from this, the items of heaviest cost are land rental, interest on cattle and equipment, and marketing charges. Thus the producers south of the Equator have a pronounced handicap in competition with the cattle producer and feeder in the United States, where the cost of dry feed is the largest item of expense for other than "grass beef," and is an important cost item for most of the latter. It may be assumed that Argentina typifies this condition, and costs of production secured in that country permit a comparison with the industry in the United States during the high-cost period of 1918–19 and 1919–20. This comparison is based on data summarized in Tables 7 and 8, on pages 21 and 83 preceding. Unfortunately, there are no cost data for

"grass beef" in the United States, and the comparison must be made between alfalfa and grass-fattened beeves in Argentina and corn-fed beeves in this country.

Argentina graziers secured their feeder cattle during 1918–19 and 1919–20 at an estimated average cost of 6.3 cents per pound, live weight. American cattle feeders paid an average of about 9.9 cents. Argentine cattle were sold at approximately 7¼ cents per pound, American at 13.14 cents. The respective costs per pound at sale weights were approximately 6.6[75] and 14.3 cents. The difference in purchase price and finished cost per pound represents the amount of handicap held by the Argentine grazier under conditions which prevailed before the recent decline in the cattle, beef, and feed markets in the United States. The Argentine beef carcass is reported to have represented an outlay to the packer of 9¼ cents per pound, the American approximately 17½ cents. This difference in cost to the packer was partly nullified by the superior quality of and price preference for American chilled beef as compared with Argentine frozen and chilled, and also in part by the difference in storage and shipping charges for marketing from South America. Since 1920, costs in beef fattening in the United States have greatly decreased, partly because of cheaper feeder cattle, but largely because of cheaper feedstuffs. Argentine costs have fallen much less, as they were not inflated to the same extent as costs in the United States, where most cattle feeders must gamble not only on the cattle market but, to a considerable extent, on the price of feed as well.

In Australia producers on lands leased from the State have a substantial advantage over those in Argentina, owing to the low rentals paid. Their lower grazing charge is partly offset, however, by the heavier shipping costs from Australia, and by the necessity of shipping their beef in the frozen form. It therefore sells for substantially less than that part of the Argentine exports which is marketed as chilled beef. It has been estimated that in 1921 the cost per hundred pounds for beef cattle produced on ranches in Queensland, the chief source of export beef in Australia, averaged approximately $5.40,[76] or substantially less than in Argentina, where there appears to have been little change from 1920 costs.

Tariff History.

Changes in the duties upon beef, veal, and cattle have been frequent and wide. Until about 1910 they could have had little influence either on cattle or beef, as until that year this country was a heavy exporter of both, and domestic prices remained in line with the world market.

Under the tariff act of 1883 the duty upon beef was 1 cent per pound; in 1890 it was 2 cents; in 1894, 20 per cent ad valorem; in 1897, 2 cents per pound; in 1909, 1½ cents; in 1913 beef was placed upon the free list; under the emergency tariff act of May 27, 1921, it was 2 cents, while the act of September 22, 1922, fixes the duty at 3 cents per pound. Reference has already been made to the fact that it was not until the fiscal year 1914 that substantial imports of beef

[75] All items of interest included in cost, but no allowance made for distribution of losses owing to drought years.

[76] Statement of A. C. Mills, in The Producer, May, 1922, p. 36.

occurred. On cattle the duty of 20 per cent ad valorem in the act of 1883 was made specific in the law of 1890, at $2 per head for animals 1 year old and under, and $10 per head for cattle over 1 year old. Since the average value of those imported in 1890 was $6.30, this duty was prohibitive except for high-priced cattle; in 1892 only 2,036 were imported, as against 26,760 in 1890.

While the act of 1883 was in force, Americans had invested considerable sums in the Mexican cattle industry. They were particularly affected by the specific duty of $10 per head, because most of the imports from Mexico were thin stockers and feeders of inferior breed, averaging much less in value than the amount of duty levied upon them. These animals could not be grown and exported at a profit under the 1890 tariff. Considerable numbers were held in Mexico and brought in after the duty was changed back to 20 per cent ad valorem in the act of 1894. Imports increased from 1,592 in 1894 to 149,781 in 1895. In the hearings preliminary to the passage of the act of 1897, it was shown by people interested in the Mexican cattle trade that the average value of animals coming from Mexico was so much lower than that of animals bred in Canada that a specific duty which the trade in the higher-priced cattle might support would be prohibitive to those from Mexico. A rather complicated combination of specific and ad valorem duties was decided upon. On cattle less than 1 year old the duty was $2 per head; on other cattle valued at not more than $14 per head, the duty was $3.75; and if valued at more than $14 per head, it was 27½ per cent ad valorem. Since most of the animals imported at that time were valued at less than $14 per head, the specific duty usually applied. But the provision was somewhat difficult to administer and to some extent invited fraud and undervaluation. The same duties were continued in the act of 1909. Cattle were put on the free list in 1913.[77] The emergency tariff placed the duty at 30 per cent ad valorem and the act of September 21, 1922, places the duty at 1½ cents per pound for cattle weighing less than 1,050 pounds and 2 cents per pound for heavier cattle.

BREEDING STOCK.

Previous to the act of 1913, in which all cattle were put on the free list, there was provision for the free importation of special classes of cattle. Cattle imported by a citizen of the United States specially for breeding purposes were admitted free, provided they were registered as pure bred of a recognized breed. Cattle straying across the border into any foreign country, or driven across for temporary pasturage, were readmitted free, provided they were brought back within six months. Cattle brought into the United States temporarily for a period not exceeding six months, for breeding or exhibition purposes, were admitted free. General provisions, covering these classes of animals, were carried over into paragraphs 397 and 398 of the act of 1913.

QUARANTINE.

Paragraph H, subsections 1 and 2, Section IV of the act of 1913 prohibits the importation of meat cattle with the provision that the prohibition may be suspended by the Secretary of the Treasury in

[77] *Tariff act of 1913, Sec. I, par. 619. Cattle (free list).* See p. 122, for details by years under the various acts.

cases when he shall determine that such importation will not tend to the introduction or spread of contagious diseases among the cattle in the United States.[78] This provision has been carried along in the tariff acts since 1890, when general provision for the inspection and quarantine of animals was made. (Act of August 30, 1890, 26 Stat. L. 414; and in the act of February 2, 1903, 32 Stat. L. 791.) Under these general quarantine acts powers are vested in the Secretary of Agriculture for carrying out the acts, and the work is actually done under his authority by the Bureau of Animal Industry. These quarantine laws restrict the importation of cattle to some extent and afford some indirect protection to the domestic producer.

Tariff Considerations.

It should be noted that a duty on beef and cattle at the present time could not raise domestic prices by the full amount of the levy. This was equally as true in 1913, when this country first showed a net import balance of beef and meats. Exports of pork and pork products were and still are too large; the world market was and yet is too potent a factor in determining hog and pork prices in the United States; and there is too large a degree of interchangeability between beef and pork, especially during periods of depression, to permit a duty on beef and on cattle to be fully effective. Pork is by far the leading competitor of beef in the United States and elsewhere, whatever the industrial situation, but during periods of partial employment, as in 1921, or when beef prices are deemed too high, the greater economy of the smaller, more convenient pork cuts reacts unfavorably on the demand for beef. Thus during the period about 1910 to 1914, when beef prices were tending upward more or less steadily, the per capita consumption of beef was greatly reduced, but that of pork remained substantially unchanged. Virtually the sole deficiency in American production in 1913 to 1915 was in beef and beef products, net imports of which amounted to 461,271,000 pounds in 1914, or nearly 8 per cent of domestic production.[79] Our net exports of pork and pork products, including lard, amounted to 900,000,000 pounds, or 10 per cent of our total pork and lard production. This was enough to permit the world market to affect domestic pork prices considerably, and indirectly to affect domestic beef prices. In the fiscal year 1921 net imports of beef totaled 69,574,000 pounds, about 1 per cent of production; net exports of pork and lard were 1,548,039,000 pounds, or approximately 15 per cent of domestic production. In consequence, the effectiveness of import duties upon beef and cattle would be lessened by the effect of the world market on the domestic price of pork and hogs, which in turn would react on the price of beef and cattle.

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[78] Tariff act of 1913, Sec. IV, par. H, subsec. 1, That the importation of meat cattle and the hides of meat cattle from any foreign country into the United States is prohibited: *Provided*, That the operation of this section shall be suspended as to any foreign country or countries whenever the Secretary of the Treasury shall officially determine, and shall give public notice thereof, that such importation shall not tend to the introduction or spread of contagious or infectious diseases among the cattle of the United States; and the Secretary of the Treasury is hereby authorized and empowered, and it shall be his duty to make all necessary orders and regulations to carry this section into effect, or to suspend the same as herein provided, and to send copies thereof to the proper officers of the United States, and to such officers or agents of the United States as he shall judge necessary.

Subsec. 2. That any person convicted of willful violation of the preceding subsection shall be fined not exceeding $500, or imprisoned not exceeding one year, or both, in the discretion of the court.

[79] See p. 38.

If a duty be placed on beef and cattle, that on beef should be carefully correlated with the duty on live animals. The form and ratio of duties will largely determine whether imports take the form of feeders and stockers, fat cattle, or beef and veal. Animals imported for fattening are raw material for farmers engaged in the feeding of cattle for market and add to the domestic production of valuable by-products. These thin animals compete directly with home-bred stocker and feeder animals. Imports of fat cattle compete both with domestic producers of butcher and of thin animals. The same is true of imports of dressed beef and beef products. Dairy animals, like stockers and feeders, are not for immediate consumption except in the case of relatively limited arrivals of cutter and canner and some fat cows, but they compete with domestic dairy cattle, which supplement largely the supply of beef. Cattle imported for breeding purposes have been and should remain on the free list.

Canada and Mexico are the only countries from which the domestic producer needs fear competition from butcher cattle in his home market. Should a duty be levied on cattle, consideration should be given to the large difference in average value of import from Mexico and Canada. Thus imports of cattle from Canada in 1920 averaged $85 in value, while the average value of imports from Mexico was $31. Most of the cattle imported from Mexico have been light cattle of inferior grades fit only for canner demand or at best for grazers and feeders, while the animals imported from Canada are large framed, well-bred animals, a large proportion of which either are already fat or ready for rapid finishing. Some of these have brought the top price for feeding steers in the Chicago and St. Paul markets.

FORM OF IMPORT DUTIES.

Three forms of import duties on beef and cattle would seem to merit serious consideration—(1) ad valorem rates; (2) specific rates per pound on beef and on live cattle, the latter differing for cattle under or over 2 years of age; and (3) specific rates on beef and on live cattle, with two or three classes of the latter, to vary according to weight. These forms are briefly discussed below.

The fact that a very large proportion of the live cattle imported comes from neighboring countries lessens the force of several of the general objections to the ad valorem form of duty. An ad valorem duty would give flexibility to duties on the different classes of cattle, i. e., fat cattle, ready for immediate slaughter; feeder and stocker cattle, brought into this country for fattening; and dairy animals. These different classes show a considerable range in value per 100 pounds. An ad valorem duty would take care of differences in grade, quality, and value, and a given ad valorem rate on live animals would be approximately offset by the same rate on dressed meat, since the relation between live and dressed values is fairly constant. But ad valorem duties on agricultural commodities are open to serious objection in that the relation between market prices and production costs is much less close than in the case of manufactured articles. In addition, seasonal climatic variations cause fluctuations in volume of production and changes from normal price levels. Ad valorem duties exaggerate the effect of such variations against the producer's interest when prices suddenly fall, and

more protection is needed; and against the consumer's interest when prices suddenly rise, and, speaking generally, less protection is needed. Moreover, it is especially in the case of agricultural commodities that seasonal factors cause changes from normal volume of production and variations from normal price levels.

A specific rate per pound on cattle and on beef would obviate the latter difficulty, and this method would also levy the duty roughly according to value, i. e., would in some degree approach an ad valorem rate in flexibility, since the value of imported beef cattle varies largely according to weight of the animal. While this is not so true of dairy cattle, the latter constitute only a small proportion of the total imports. However, a flat specific rate per pound on cattle would overlook an important difference in value of different classes of animals, and would discriminate somewhat against thin animals, particularly those of the Mexican type. Among beef cattle the most important difference in value per 100 pounds is between fat cattle on the one hand and stocker and feeder animals on the other. Thus if a proportionally higher duty per pound were levied on fat than on feeder and stocker cattle, the distribution of the duty would be more nearly according to value.

An attempt to remove the discrimination against thin animals by applying a higher rate on animals 2 years old or over would be a step in the right direction, but falls short of the desired effect, since most feeder cattle which have been imported were 2 years of age or over, and would be taxed at the same rate per 100 pounds as fat cattle. A higher rate on cattle 3 years of age or older would be equally incorrect. Age is not necessarily an accurate measure of the need for higher or lower duties as between different classes of cattle.

A better plan would be to levy a graduated specific duty on live weight without respect to age. In most cases, within a given class weight is closely related to quality, and a duty in this form would approximate fairly closely to the flexibility of an ad valorem rate. Unless careful weight estimates are made by experienced inspectors, or central market weights were used for cattle shipped in, platform scales would be necessary at points of entry, but their value in eliminating controversy would make them well worth their cost. However, the great bulk of the imports are consigned to central markets, where accurate weights are matters of routine procedure. In the case of cattle driven in, small platform scales are already available in towns along the border. Railings to pen cattle for weighing on such scales can be supplied at small cost.

The simplest graduation in duty per pound of live weight would be on the basis of average differences in price of stockers and feeders as compared with beef steers on the Chicago market during a series of pre-war years. Thus from 1910 to 1916, inclusive, stockers and feeders averaged 74 per cent as high as native beef steers. This would suggest a proportionate duty per pound live weight. With some allowance made for hides and offal, and assuming a dressing percentage of 55 for imports of fat cattle, a duty of 3½ cents per pound on dressed beef corresponds to a duty of 2 cents per pound live weight on fat cattle and 1½ cents per pound on stockers and feeders. A further refinement would be a duty of 2 cents on fat cattle, 1.6 cents on feeders, and 1.4 cents on stockers. The latter

would be more equitable for cattle of the Mexican type, but would complicate somewhat the administration of the duty. For this reason the simpler levy would seem preferable; it deals with approximate fairness with all classes. With no allowance for hides, or with hides on the free list, a duty of 3.5 cents per pound on beef would correspond with 1.9 cents on fat cattle and 1.4 cents on stockers and feeders, or 1.5 cents on feeders and 1.3 cents on stockers. With a specific duty of 2 cents per pound on beef, and hides on the free list the proper live-weight duty on fat cattle imported would be approximately 1.1 cents on fat cattle and 0.8 cent per pound live weight on stockers and feeders.

A proper division in weight[80] between fat cattle and the lighter class would be approximately 1,050 pounds. Thus the higher rate should apply to animals weighing 1,050 pounds or more. The more fleshy feeders which are received from Canada would then be dutiable in the fat-cattle class, but such animals are normally competed for sharply by the packers and, if put on feed, usually are returned to the markets in a comparatively short time. This weight division would deal with the stocker and feeder class with approximate fairness. If two weight divisions were made, fat cattle might properly be considered as weighing 1,100 pounds or more, feeders about 750 to 1,099 pounds, and stockers those weighing less than 750 pounds.

STATISTICAL APPENDIX.

DOMESTIC EXPORTS, 1906–1921.

TABLE 1.—*Cattle.*

Exported to—	Fiscal year.					
	1906		1907		1908	
	Number.	Value.	Number.	Value.	Number.	Value.
Canada	15,633	$453,350	13,125	$355,786	8,273	$255,853
Mexico	18,641	666,962	30,802	836,729	30,304	722,585
Bermuda	1,503	109,889	1,131	84,446	688	53,219
Cuba	130,639	1,977,088	24,062	439,795	7,586	146,781
Guatemala	32	2,815	9	784	1	150
Dominican Republic						
United Kingdom	405,277	37,729,300	343,971	31,933,162	294,026	27,354,631
Belgium	9,516	918,620	8,273	809,510	7,143	701,350
Argentina	30	13,600	14	5,600	2	2,700
Brazil	1,359	104,890	610	47,152	369	32,712
France						
Germany			600	48,000		
All other countries	1,609	104,656	454	36,428	818	69,131
Total	584,239	42,081,170	423,051	34,577,392	349,210	29,339,134

[80] The class known as fat cattle varies considerably in weight, but a fair minimum would be approximately 1,050 to 1,100 pounds for imported animals.

DOMESTIC EXPORTS—continued.

TABLE 1.—*Cattle*—Continued.

Exported to—	Fiscal year. 1909		1910	
	Number.	Value.	Number.	Value.
Canada	8,103	$209,914	10,283	$323,274
Mexico	8,372	381,481	5,149	253,160
Bermuda	807	70,163	761	62,022
Cuba	2,196	40,349	207	8,642
Guatemala	32	1,675	25	1,475
Dominican Republic				
United Kingdom	185,303	17,094,215	122,139	11,479,129
Belgium	1,968	191,520	270	27,000
Argentina			1	500
Brazil	132	10,715	37	5,061
France				
Germany				
All other countries	629	46,944	558	39,891
Total	207,542	18,046,976	139,430	12,200,154

Exported to—	Fiscal year. 1911		1912		1913	
	Number.	Value.	Number.	Value.	Number.	Value.
Canada	7,890	$257,934	6,705	$244,918	11,691	$391,644
Mexico	6,513	306,615	9,457	412,266	8,358	362,243
Bermuda	1,111	88,486	1,786	146,824	1,183	105,948
Cuba	328	12,330	476	11,585	127	5,220
Guatemala	152	7,020	42	3,778	52	5,282
Dominican Republic	3	755	1	135	37	2,908
United Kingdom	131,273	12,211,910	76,925	7,015,042	1,773	164,680
Belgium	2,332	233,200	9,515	954,080		
Argentina	15	7,000	3	1,000	23	2,950
Brazil	87	8,215	66	8,711	923	90,500
France						
Germany						
All other countries	396	30,455	530	71,736	547	45,824
Total	150,100	13,163,920	105,506	8,870,075	24,714	1,177,199

Exported to—	Fiscal year. 1914		1915		1916	
	Number.	Value.	Number.	Value.	Number.	Value.
Canada	8,957	$330,005	751	$48,854	4,511	$162,515
Mexico	7,230	124,640	829	45,728	3,990	104,853
Bermuda	952	105,767	1,030	114,520	952	107,585
Cuba	506	34,418	186	5,420	826	47,307
Guatemala	176	8,525	15	985	17	4,365
Dominican Republic	133	4,885	96	4,620	62	3,205
United Kingdom					815	109,016
Belgium						
Argentina	10	2,610	10	5,000	56	37,300
Brazil	3	1,400	413	53,690	1	750
France			2,082	416,400	9,901	1,722,755
Germany						
All other countries	409	35,038	72	7,630	156	18,597
Total	18,376	647,288	5,484	702,847	21,287	2,378,248

DOMESTIC EXPORTS—continued.

TABLE 1.—*Cattle*—Continued.

Exported to—	Fiscal year.					
	1917		1918		1919	
	Number.	Value.	Number.	Value.	Number.	Value.
Canada	6,382	$462,728	7,286	$638,304	9,335	$749,357
Mexico	4,324	231,893	7,777	249,654	26,964	742,974
Bermuda	842	99,405	1,203	141,310	.....	.....
Cuba	1,476	88,456	1,607	142,880	5,013	257,543
Guatemala	57	4,855	2	100	.....	.....
Dominican Republic	3	215	26	4,359	8	730
United Kingdom	.....	.....	19	2,850	.....	.....
Belgium	.....	.....	.....	.....	530	185,500
Argentina	31	16,650	.....	.....	48	49,173
Brazil	16	4,808	59	18,830	30	13,410
France	.....	.....	.....	.....	135	28,595
All other countries	256	40,493	234	49,513	282	65,319
Total	13,387	949,503	18,213	1,247,800	42,345	2,092,818

Exported to—	Fiscal year.			
	1920		1921	
	Number.	Value.	Number.	Value.
Canada	6,596	$541,135	7,749	$803,747
Mexico	9,985	722,005	83,524	3,479,058
Bermuda	18	5,918	27	4,852
Cuba	19,921	1,215,302	20,653	1,758,067
Guatemala	33	9,705	40	18,900
Dominican Republic	71	7,645	271	18,850
United Kingdom	100	20,000	24,935	3,372,287
Belgium	33,512	6,550,641	5,685	945,211
Argentina	106	156,700	208	189,525
Brazil	6	2,100	104	57,275
France	11,263	2,173,955	184	36,800
Germany	.....	.....	1,485	85,650
All other countries	1,428	516,412	808	179,680
Total	83,039	11,921,518	145,673	10,960,507

Exported to—	Calendar year.			
	1918		1919	
	Number.	Value.	Number.	Value.
Canada	7,314	$567,415	11,192	$858,621
Mexico	7,885	256,116	23,923	823,259
Bermuda	318	41,006	10	2,150
Cuba	1,333	122,623	13,943	627,649
Guatemala	.....	.....	2	275
Dominican Republic	.....	.....	57	2,220
Belgium	.....	.....	9,067	1,730,025
Argentina	.....	.....	48	49,175
Brazil	70	23,990	20	8,450
France	.....	.....	11,314	2,179,406
All other countries	360	71,608	283	129,304
Total	17,280	1,082,758	69,859	6,429,521

DOMESTIC EXPORTS—continued.

TABLE 1.—*Cattle*—Continued.

Exported to—	Calendar year.			
	1920		1921	
	Number.	Value.	Number.	Value.
Canada	4,624	$575,194	7,823	$728,399
Mexico	27,758	1,478,779	138,239	5,139,263
Bermuda	31	8,336	20	5,304
Cuba	20,766	2,043,021	15,182	745,715
Guatemala	69	27,930	2	400
Dominican Republic	290	24,395	3	630
United Kingdom	100	20,000	31,324	4,399,949
Belgium	29,300	5,734,656	2,013	263,075
Argentina	168	202,675	183	189,750
Brazil	82	46,925	25	11,250
France	184	43,144	84	16,800
Germany			1,485	185,650
All other countries	1,930	547,470	150	54,385
Total	85,302	10,752,525	196,533	11,740,570

TABLE 2.—*Fresh beef and veal.*

Exported to—	Fiscal year.					
	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Panama	99,724	$9,710	1,660,500	$144,462	4,014,648	$331,409
Bermuda	524,216	47,463	515,767	46,324	698,806	61,940
Canada	163,048	16,974	237,078	24,311	155,912	13,997
Cuba	116,186	10,047	1,020,208	92,057	620,594	53,359
United Kingdom	265,444,554	24,075,717	277,018,017	25,939,485	195,220,020	19,832,743
France					175,645	17,566
Italy	110,574	9,118	184,346	14,847	92,824	8,576
All other countries	1,595,925	141,009	1,015,586	105,801	175,656	11,787
Total	268,054,227	24,310,038	281,651,502	26,367,287	201,154,105	20,339,377

Exported to—	Fiscal year.					
	1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Panama	4,876,836	$425,297	4,041,542	$354,886	4,221,393	$374,593
Bermuda	555,627	55,694	393,623	41,488	561,483	54,589
Canada	190,989	20,278	136,389	13,148	247,598	25,777
Cuba	1,073,580	94,096	95,197	10,271	42,058	4,904
United Kingdom	115,783,556	12,060,183	70,795,239	7,288,483	37,257,683	3,998,463
France						
Italy	204,649	15,467	86,049	5,546	1,000	125
All other countries	267,434	27,579	181,627	19,929	179,516	19,950
Total	122,952,671	12,698,594	75,729,666	7,733,751	42,510,731	4,478,401

DOMESTIC EXPORTS—continued.

TABLE 2.—*Fresh beef and veal*—Continued.

Exported to—	Fiscal year.					
	1912		1913		1914	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Panama	5,400,785	$549,660	5,935,198	$704,877	5,534,391	$666,640
Bermuda	175,582	21,095	379,883	48,606	483,050	62,942
Canada	585,222	77,769	640,078	98,061	253,781	39,338
Cuba	44,911	5,353	124,516	15,143	37,950	6,631
United Kingdom	8,872,378	920,225	126,885	12,677	.....	.....
France	.....	.....	.....	.....	.....	.....
Italy	14,348	1,148	.....	.....	.....	.....
All other countries	171,094	21,069	155,828	22,785	85,232	13,824
Total	15,264,320	1,596,319	7,362,388	902,149	6,394,404	788,793

Exported to—	Fiscal year.			
	1915		1916	
	Pounds.	Value.	Pounds.	Value.
Panama	3,706,596	$449,753	1,504,583	$202,275
Bermuda	655,701	76,522	885,046	102,721
Canada	545,356	66,528	3,192,196	320,030
Cuba	533,334	72,078	53,236	8,596
United Kingdom	54,497,192	6,813,887	117,409,488	15,158,886
France	99,620,095	12,931,138	49,100,444	5,436,020
Italy	10,472,425	1,270,444	47,887,945	6,340,028
All other countries	410,235	51,283	11,181,062	1,317,443
Total	170,440,934	21,731,633	231,214,000	28,885,999

Exported to—	Fiscal year.			
	1917		1918	
	Pounds.	Value.	Pounds.	Value.
Panama	235,034	$45,438	144,442	$34,[illegible]
Bermuda	1,326,911	160,193	509,584	89,[illegible]
Canada	17,771,159	2,171,951	37,349,521	5,309,[illegible]
Cuba	58,103	9,516	203,401	29,[illegible]
United Kingdom	125,687,523	17,338,095	285,789,315	54,209,[illegible]
France	38,042,276	4,833,959	36,926,941	5,796,[illegible]
Italy	13,066,277	1,569,318	8,566,613	1,638,[illegible]
All other countries	989,818	148,801	543,083	84,[illegible]
Total	197,177,101	26,277,271	370,032,900	67,383,[illegible]

DOMESTIC EXPORTS—continued.

TABLE 2.—*Fresh beef and veal*—Continued.

Exported to—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value.
Panama	357,366	$104,207	51,950	$16,275
Bermuda	929,837	188,846	823,486	171,732
Canada	10,390,596	1,728,229	2,621,011	481,298
Cuba	152,741	26,139	256,780	41,442
United Kingdom	446,080,785	96,364,943	73,073,602	17,206,380
France	47,170,950	9,410,674	.....	.....
Italy	8,877,471	1,715,353	21,375,475	4,621,058
All other countries [1]	381,783	66,972	76,224,695	17,742,562
Total	514,341,529	109,605,363	174,426,999	40,280,747

Exported to—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
Panama	86,537	$23,146	317,522	$61,724
Bermuda	1,185,243	231,277	1,165,789	189,653
Canada	2,330,963	393,236	228,624	37,544
Cuba	450,025	92,003	346,554	73,613
United Kingdom	5,699,488	1,019,012	2,139,119	281,347
France	730,217	141,285	.....	.....
Italy	211,447	40,682	.....	.....
All other countries [1]	78,955,228	15,624,246	6,143,399	1,154,487
Total	89,649,148	17,564,887	10,341,007	1,798,398

[1] Includes the following:

Exported to—	1918		1919		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Belgium	105,000	$18,387	23,469,602	$5,044,664	35,205,492	$7,098,318	4,897,473	$979,490
Germany	.....	.....	31,083,572	7,499,508	26,159,680	5,167,412	431,665	54,828
Netherlands	.....	.....	13,708,452	3,364,776	15,922,196	3,098,622	14,615	1,004
Sweden	.....	.....	5,942,657	1,469,841	.....	.....	.....	.....

DOMESTIC EXPORTS—continued.

TABLE 3.—*Canned beef.*

Exported to—	Fiscal year.					
	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
United Kingdom	44,335,871	$4,431,616	7,188,584	$740,318	15,343,302	$1,619,572
Belgium	1,465,671	155,017	317,732	34,551	456,838	50,154
British South Africa	5,047,053	480,475	679,475	75,115	1,299,476	142,377
Panama	263,989	26,363	407,208	41,368	301,833	28,969
Cuba	243,929	23,585	173,378	17,618	182,970	20,969
Mexico	273,531	27,562	261,436	26,882	140,003	15,133
France	1,058,309	104,676	986,491	98,644	629,805	65,037
Italy	91,939	9,201	114,621	11,409	59,170	5,985
Canada	460,310	45,424	98,788	11,426	80,077	9,969
All other countries [1]	11,282,757	1,126,527	5,582,113	558,477	4,882,973	509,640
Total	64,523,359	6,430,446	15,809,826	1,615,808	23,376,447	2,467,875

Exported to—	Fiscal year.					
	1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
United Kingdom	9,301,253	$1,024,599	9,299,525	$1,050,913	6,292,350	$718,000
Belgium	363,816	40,020	405,812	45,909	282,637	31,292
British South Africa	1,010,228	119,703	740,250	91,917	862,569	102,344
Panama	331,836	33,778	375,461	40,119	367,476	42,228
Cuba	261,540	34,856	97,401	12,230	282,744	33,627
Mexico	80,080	8,636	98,144	11,387	103,470	13,239
France	398,881	40,470	225,889	22,417	78,096	8,278
Italy	77,755	8,247	22,312	2,414	9,560	1,162
Canada	77,233	10,775	204,763	24,024	40,884	6,795
All other countries [1]	2,992,885	324,738	3,335,039	377,122	2,504,718	298,012
Total	14,895,527	1,645,822	14,804,596	1,678,452	10,824,504	1,254,979

[1] Includes the following:

Exported to—	1906		1907		1908		1909		1910	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany	1,715,288	$166,736	2,003,143	$198,231	1,686,563	$175,902	497,280	$50,530	83,022	$8,677
Japan	2,306,583	231,185	98,112	9,810	35,144	4,049	10,304	1,315	11,591	1,359
Portuguese Africa	1,056,868	108,000	300,042	27,805	547,276	58,283	448,742	50,874	664,025	71,308
Total	5,078,739	505,921	2,401,297	237,846	2,268,983	238,234	956,326	102,719	758,638	81,344

DOMESTIC EXPORTS—continued.

TABLE 3.—*Canned beef*—Continued.

Exported to—	Fiscal year.					
	1912		1913		1914	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
United Kingdom	5,743,114	$633,160	3,117,149	$385,294	1,193,804	$154,065
Belgium	286,080	32,373	117,750	24,957	381,099	52,978
British South Africa	726,788	91,723	475,408	63,638	299,057	41,139
Panama	307,204	35,073	423,628	50,336	279,517	33,298
Cuba	185,424	22,170	129,554	20,621	173,415	24,797
Mexico	197,262	24,113	325,660	40,548	145,693	21,154
France	106,844	10,788	119,450	12,353	39,550	5,447
Italy	11,960	1,512	4,200	486	4,040	521
Canada	123,322	18,211	111,347	16,203	63,358	9,272
All other countries	3,338,433	434,281	2,016,202	243,390	885,200	119,230
Total	11,026,431	1,303,404	6,840,348	857,826	3,464,733	461,901

Exported to—	Fiscal year.			
	1915		1916	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	64,700,738	$9,927,173	38,205,216	$7,546,162
Belgium	28,381	4,723	.....	.....
British South Africa	251,140	41,512	395,933	73,306
Panama	51,296	6,634	57,219	7,132
Cuba	183,479	19,787	54,115	7,198
Mexico	80,044	13,315	270,701	41,895
France	6,439,680	1,386,430	6,508,241	861,964
Italy	964,500	149,381	1,967,935	349,299
Canada	72,460	9,023	35,303	7,382
All other countries [1]	2,471,543	415,552	3,309,102	544,728
Total	75,243,261	11,973,530	50,803,765	9,439,066

Exported to—	Fiscal year.			
	1917		1918	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	40,218,190	$9,960,653	46,375,149	$14,246,557
British South Africa	230,924	50,323	105,641	24,439
Panama	51,858	11,497	12,273	2,887
Cuba	49,907	10,718	173,837	45,814
Mexico	298,376	61,761	146,501	38,992
France	17,653,357	4,231,426	30,417,036	9,116,301
Italy	187,634	45,456	17,698,743	5,813,019
Canada	7,570,982	2,276,519	1,118,377	391,087
All other countries	1,274,897	297,677	1,295,726	355,611
Total	67,536,125	16,946,030	97,343,283	30,034,707

[1] Includes 2,205,835 pounds, valued at $370,000, to Russia in Europe, 1916.

DOMESTIC EXPORTS—continued.

TABLE 3.—*Canned beef*—Continued.

Exported to—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	51,250,973	$18,068,783	13,947,951	$5,250
Belgium	244,848	116,157	6,471,198	2,772
British South Africa	6,000	685	57,918	3
Panama	6,817	1,818	8,534	1
Cuba	264,151	81,454	126,334	4
Mexico	201,297	71,434	114,993	4
France	39,791,821	14,031,746	1,837,883	732
Italy	47,675,117	18,437,206	15,405,107	6,474
Canada	804,098	310,750	352,721	139
All other countries [1]	1,212,041	377,977	15,544,688	5,277
Total	141,457,163	51,498,010	53,867,327	20,671

Exported to—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	1,795,554	$693,605	3,762,787	$74
Belgium	703,419	208,309	395	
British South Africa	38,467	15,289	16,815	
Panama	17,041	5,557	21,567	
Cuba	297,120	97,616	98,314	2
Mexico	162,091	50,857	281,612	7
France	27,367	7,747	70,132	1
Italy	512	126	576	
Canada	358,151	124,208	258,191	7
All other countries [1]	20,366,278	4,586,397	1,566,859	23
Total	23,766,000	5,789,711	6,077,248	1,27

[1] Includes the following:

Exported to—	1918		1919		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	V
Austria-Hungary			2,407,700	$881,899				
Denmark			1,085,509	446,815	5,000	$1,500		
Germany			2,128,219	694,053	144,133	36,443	802,875	$1
Greece			14,198	4,673	1,080,950	330,591	72	
Poland and Danzig					16,722,800	3,443,677	98	
Sweden	188	$72	5,530,871	1,545,636	20,846	7,462		
Total	188	72	11,166,587	3,573,076	17,973,729	3,819,673	803,045	1

DOMESTIC EXPORTS—continued.

TABLE 4.—*Pickled and other cured beef.*

Exported to—	Fiscal year. 1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	5,784,435	$307,567	5,274,470	$266,880	4,749,770	$313,146
United Kingdom	18,681,138	1,102,665	18,370,818	1,255,946	14,240,732	1,059,738
Germany	24,102,929	1,498,891	10,005,794	592,223	4,225,635	287,536
British Guiana	1,669,338	90,176	1,335,000	74,312	1,185,996	79,770
Dutch Guiana	1,775,012	107,755	1,441,000	85,183	1,759,676	119,980
Canada	2,905,076	162,626	3,569,700	186,511	2,149,119	128,100
British West Indies	6,046,778	329,273	4,955,987	294,911	5,012,188	328,676
Norway	2,704,514	143,823	2,471,130	126,084	1,575,857	90,917
Belgium	3,231,398	171,748	3,617,638	219,216	2,805,608	206,913
Netherlands	1,303,307	73,793	903,159	59,314	750,880	57,028
Russia in Europe	66,435	4,200	144,536	8,904	.....	.....
All other countries [1]	13,017,221	727,288	11,609,336	678,684	9,440,626	648,146
Total	81,287,581	4,719,805	63,698,568	3,848,168	47,896,087	3,319,950

Exported to—	Fiscal year. 1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	4,669,620	$326,615	5,073,693	$348,595	5,820,850	$461,898
United Kingdom	13,591,934	1,106,791	10,457,073	777,531	10,263,107	964,721
Germany	5,162,946	385,581	4,067,732	291,250	4,581,262	385,665
British Guiana	1,352,402	104,411	1,047,235	80,071	1,491,734	131,049
Dutch Guiana	1,755,168	139,208	1,404,630	110,740	1,713,955	148,999
Canada	2,398,726	167,481	1,335,621	92,701	1,818,246	139,697
British West Indies	3,785,427	293,664	2,716,681	220,998	3,731,397	323,674
Norway	1,503,217	114,413	1,251,048	91,482	1,810,634	144,055
Belgium	2,402,235	192,593	2,140,067	177,616	1,842,617	153,038
Netherlands	813,233	59,008	629,231	45,967	792,713	64,909
Russia in Europe	119,560	9,821	83,232	5,500	17,200	1,876
All other countries [1]	7,234,595	572,781	6,665,070	541,250	6,400,034	582,098
Total	44,789,063	3,472,367	36,871,313	2,783,701	40,283,749	3,501,179

[1] Includes the following:

Exported to—	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Denmark	2,179,175	$117,209	3,319,182	$199,390	1,584,443	$110,574
Panama	872,624	55,002	1,472,329	93,506	1,069,363	77,968
Russia in Asia	2,487,566	131,410	218,036	10,622	50,600	3,040

Exported to—	1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Denmark	633,600	$39,973	511,678	$36,306	494,955	$38,907
Panama	846,058	70,031	1,699,387	150,635	1,099,062	107,350
Russia in Asia	201,844	15,236	239,200	16,120	.....	.....

DOMESTIC EXPORTS—continued.

TABLE 4.—*Pickled and other cured beef*—Continued.

Exported to—	Fiscal year.					
	1912		1913		1914	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	5,077,404	$347,460	3,807,237	$332,347	4,935,657	$477,
United Kingdom	8,747,355	703,858	5,929,949	594,217	4,113,347	410,
Germany	4,616,317	320,878	3,080,823	303,120	1,757,786	164,
British Guiana	1,217,259	84,287	945,923	96,491	1,351,705	132,
Dutch Guiana	1,664,728	114,556	1,274,105	140,081	1,371,678	137,
Canada	1,752,093	122,423	712,086	62,341	1,331,150	125,
British West Indies	3,428,799	254,774	2,413,078	253,448	3,008,610	305,
Norway	2,121,392	146,375	1,331,732	102,789	657,610	57,
Belgium	1,829,284	151,713	553,893	51,881	555,614	64,
Netherlands	749,096	55,643	467,841	43,750	275,668	25,
Russia in Europe	53,250	3,774				
All other countries [1]	6,830,930	526,368	5,340,252	509,500	3,907,149	384,
Total	38,087,907	2,832,109	25,856,919	2,489,965	23,265,974	2,289,

Exported to—	Fiscal year.			
	1915		1916	
	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	4,331,261	$401,791	5,027,163	$465,
United Kingdom	10,994,101	1,262,205	12,003,390	1,429,
Germany	378,548	46,804	400	
British Guiana	1,072,586	108,843	1,090,532	109,
Dutch Guiana	988,336	103,655	938,367	91,
Canada	1,659,165	156,017	5,101,349	486,
British West Indies	2,111,925	223,036	2,241,972	231,
Norway	485,790	47,206	1,316,434	149,
Belgium	1,907,913	191,495	4,545,884	454,
Netherlands	2,367,745	245,401	95,838	11,
Russia in Europe	2,000	230	791,500	85,
All other countries [1]	5,575,373	595,927	4,961,873	736,
Total	31,874,743	3,382,670	38,114,682	4,034,

[1] Includes the following:

Exported to—	1912		1913		1914		1915	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Va
Denmark	639,156	$43,733	484,838	$38,607	257,330	$23,491	853,069	$10
Panama	1,021,504	82,060	821,424	82,366	733,411	73,207	714,425	7
Sweden					25,876	2,163	1,795,700	18

DOMESTIC EXPORTS—continued.

TABLE 4.—*Pickled and other cured beef*—Continued.

Exported to—	Fiscal year.			
	1917		1918	
	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	6,802,524	$834,354	5,505,008	$894,155
United Kingdom	7,489,665	1,063,334	4,205,294	795,511
British Guiana	1,146,700	150,227	1,021,004	179,581
Dutch Guiana	749,490	96,124	457,865	75,567
Canada	9,394,712	1,177,374	2,623,317	402,578
British West Indies	1,652,345	48,769	1,070,111	179,660
Norway	2,604,065	326,267	.....	.....
Belgium	19,986,803	2,022,259	31,235,621	3,999,841
Netherlands	4,986,920	453,215	.....	.....
Russia in Europe	224,092	26,890	5,219,043	639,467
All other countries [1]	3,016,351	529,546	3,130,647	536,164
Total	58,053,667	6,728,359	54,467,910	7,702,524

Exported to—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	5,418,221	$944,444	5,676,761	$1,019,972
United Kingdom	3,228,816	755,069	5,551,743	1,317,417
Germany	.....	.....	2,567,542	483,191
British Guiana	564,685	100,504	792,750	162,661
Dutch Guiana	672,200	133,279	404,200	83,203
Canada	2,044,979	358,092	1,373,353	176,805
British West Indies	946,830	161,648	732,386	141,465
Norway	.....	.....	4,312,960	799,256
Belgium	26,587,655	4,508,276	9,687,576	1,936,658
Netherlands	.....	.....	2,325,748	523,292
Russia in Europe	364,450	34,725	1,129,625	228,575
All other countries [1]	4,378,184	925,183	8,250,080	1,866,646
Total	44,206,020	7,921,220	42,804,724	8,739,141

Exported to—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
Newfoundland and Labrador	5,596,298	$708,152	6,407,860	$549,922
United Kingdom	4,210,631	735,397	3,950,930	584,671
Germany	1,604,050	256,865	904,562	101,070
British Guiana	824,861	106,959	918,763	88,925
Dutch Guiana	1,227,584	166,765	1,135,038	115,667
Canada	2,016,022	244,227	1,357,975	143,030
British West Indies	2,407,272	285,955	2,701,287	266,487
Norway	876,505	100,916	3,293,172	274,164
Belgium	819,475	147,632	525,896	99,743
Netherlands	1,700,784	195,335	223,753	23,507
Russia in Europe	.....	.....	22,400	1,344
All other countries [1]	4,487,694	711,612	3,148,946	335,186
Total	25,771,176	3,659,815	24,590,582	2,583,716

[1] Includes the following:

Exported to—	1918		1919		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Denmark	.....	.....	1,945,120	$418,157	500,949	$83,664	242,300	$20,084
France	1,895,750	$517,229	123,155	25,597	147,997	22,350	35,941	3,366
Italy	1,052,426	158,514	3,033,172	799,492	430,437	86,497	65,048	4,096

DOMESTIC EXPORTS—continued.

TABLE 5.—*Stearin from animal fats.*[1]

Exported to—	Fiscal year.					
	1913		1914		1915	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Canada	1,040,907	$90,662	842,016	$70,162	3,069,000	$277,935
Netherlands	485,086	38,446	422,750	35,523	1,804,523	175,368
Belgium	501,246	38,719	419,876	30,183	43,108	2,500
Cuba	169,051	19,182	390,778	39,190	498,218	48,697
Mexico	675,209	61,768	298,351	28,540	171,816	14,200
Germany	664,043	53,451	168,073	14,865	.....	.....
United Kingdom	169,219	17,120	130,155	10,418	2,727,592	249,811
Peru	12,911	1,402	5,676	511	33,237	3,582
Venezuela	.....	.....	5,000	433	399,055	39,798
Japan	.....	.....	3,985	480	94,662	8,967
France	20,035	2,003	.....	.....	755,015	77,373
Italy	.....	.....	.....	.....	192,087	19,471
Norway	.....	.....	.....	.....	55,000	4,530
Chile	.....	.....	.....	.....	43,822	4,461
Colombia	4,200	390	.....	.....	101,445	11,099
China	.....	.....	.....	.....	408,825	38,693
British India	.....	.....	.....	.....	470,317	46,533
British South Africa	.....	.....	.....	.....	400	40
All other countries	2,979	233	37,521	3,816	589,785	60,324
Total	3,744,886	323,376	2,724,181	234,121	11,457,907	1,093,663

Exported to—	Fiscal year.					
	1916		1917		1918	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Canada	1,638,244	$164,345	2,349,021	$317,582	3,044,269	$357,453
Netherlands	2,890,201	304,163	77,571	9,622	.....	.....
Belgium	21,727	3,476	.....	.....	.....	.....
Cuba	1,553,678	178,350	1,639,684	241,110	1,963,213	413,256
Mexico	143,050	16,047	91,058	13,965	330,336	80,862
United Kingdom	1,725,922	196,239	1,755,909	242,192	884,848	185,443
Peru	285,691	37,591	352,004	52,296	435,814	98,952
Venezuela	1,131,479	133,204	1,006,351	126,015	693,654	166,498
Japan	268,702	35,276	497,914	69,311	51,250	10,175
France	427,344	41,710	1,549,911	215,817	330,648	73,886
Greece	9,470	1,043	109,822	19,000	.....	.....
Italy	148,175	16,574	11,900	1,675	.....	.....
Norway	52,060	5,190	120,280	18,926	.....	.....
Sweden	296,077	33,836	79,386	11,321	.....	.....
Chile	61,298	7,335	115,819	16,710	132,272	31,325
Colombia	380,887	44,614	205,272	26,017	190,960	42,282
China	77,316	7,731	265,251	36,050	24	9
British India	255,240	32,700	448,414	53,122	963,251	238,908
British South Africa	14,096	1,883	37,272	4,140	148,880	33,023
All other countries	1,681,590	200,354	2,223,518	323,446	1,190,611	275,057
Total	13,002,247	1,461,661	12,936,357	1,798,317	10,360,030	2,181,317

[1] Included in "All other meat products" prior to 1913.

DOMESTIC EXPORTS—continued.

TABLE 5.—*Stearin from animal fats*—Continued.

Exported to—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value.
	2,917,406	$542,470	1,020,773	$209,825
ds			3,197,373	612,331
			2,111,081	278,537
	1,766,199	380,005	1,213,865	254,002
	527,077	127,212	314,193	79,871
			77,919	21,374
ngdom	866,448	173,048	3,907,895	810,694
	420,719	97,354	157,125	39,795
	858,114	206,152	597,190	129,143
	40,000	8,800		
	63,791	13,893	3,007,986	540,507
			63,670	11,490
	336,000	89,450	1,084,560	287,060
	56,000	13,450	256,093	65,292
			312,931	62,475
	321,556	67,779	60,748	15,698
	186,384	42,258	274,915	68,717
	113,392	31,749	112,207	31,314
lia	605,251	157,977	90,832	17,850
t Indies	121,605	29,189	254,710	53,071
uth Africa	172,816	38,628	377,900	78,622
ountries	1,177,483	271,746	2,360,758	503,483
l	10,550,241	2,291,160	20,854,724	4,171,151

Exported to—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
	3,500,969	$573,288	2,729,800	$224,225
ds	3,366,512	546,692	7,375,330	704,770
	509,623	83,159	680,174	51,800
	2,131,584	420,907	876,419	102,707
	937,780	222,622	890,058	108,057
	97,557	13,864	2,623,805	265,282
ngdom	1,410,672	257,103	3,718,774	340,952
	141,661	34,755	117,640	12,104
	266,211	70,782	607,927	55,992
	151,457	42,188	105,016	13,663
	320,600	52,720	4,677,018	518,562
	547,598	141,608	1,297,531	144,957
	1,675,568	441,025	703,538	74,670
	55,019	9,554	1,707,692	175,885
	194,725	37,421	1,497,621	160,775
	233,016	56,410	24,060	2,536
	482,876	134,126	152,227	17,999
	38,474	7,645	331,184	30,607
lia	74,780	9,172		
t Indies	200,600	52,108		
uth Africa	23,731	5,926	45,000	4,539
ountries	1,151,965	274,503	2,535,610	254,198
l	17,512,978	3,487,578	32,606,424	3,264,280

DOMESTIC EXPORTS—continued.

TABLE 6.—*Tallow.*

Exported to—	Fiscal year.					
	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Val
United Kingdom	37,888,851	$1,885,773	54,847,383	$3,137,951	37,770,778	$2,25
Belgium	9,177,577	424,217	14,724,658	817,689	9,503,929	53
Germany	8,679,492	444,475	13,206,334	739,072	8,385,391	49
France	18,693,257	881,916	14,897,879	785,710	9,703,387	56
Netherlands	2,752,690	142,569	7,884,618	434,867	5,994,413	35
Cuba	249,596	12,558	790,677	47,945	1,121,665	6
Mexico	1,820,156	82,312	448,537	23,075	1,190,776	6
Guatemala	1,228,453	66,733	1,032,856	59,945	598,354	3
Austria-Hungary [1]	6,607,232	324,692	6,703,733	387,063	2,397,997	13
Chile	1,597,937	82,019	1,459,777	79,912	609,562	3
Italy	3,112,018	148,304	2,012,259	108,947	3,759,777	23
Russia in Europe	166,396	8,853	2,725,339	155,882	3,284,929	21
Japan	142,929	7,344	1,645,053	89,593	1,119,478	6
Denmark	109,214	4,763	1,595,114	83,058	450,786	2
Russia in Asia	547,957	25,787	50	2	318,094	1
All other countries	4,793,401	248,710	3,883,472	231,377	5,188,511	33
Total	97,567,156	4,791,025	127,857,739	7,182,688	91,397,597	5,39

Exported to—	Fiscal year.					
	1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Val
United Kingdom	28,563,394	$1,621,725	11,787,412	$688,931	10,948,184	$70
Belgium	3,771,057	196,682	1,908,942	112,285	2,252,714	14
Germany	2,192,884	125,234	1,916,550	117,258	2,238,988	14
France	5,597,734	300,592	3,615,679	198,263	4,528,849	28
Netherlands	1,946,564	112,159	3,368,078	244,096	2,957,759	21
Cuba	1,582,822	79,589	845,630	50,338	969,377	5
Mexico	1,061,423	57,530	1,140,615	71,970	656,348	4
Guatemala	770,282	47,000	614,042	41,362	397,405	2
Austria-Hungary	156,665	9,030	----	----	144,307	
Chile	173,236	9,473	161,661	9,130	80,952	
Italy	2,540,310	147,227	653,008	35,057	1,757,167	11
Russia in Europe	586,257	32,190	430,511	27,934	689,974	4
Japan	632,645	37,170	30,102	1,640	375	
Denmark	581,903	28,069	15,597	1,480	----	----
All other countries	3,175,641	194,696	2,802,165	179,871	2,190,755	13
Total	53,332,767	3,000,366	29,379,992	1,779,615	29,813,154	1,93

Exported to—	Fiscal year.					
	1912		1913		1914	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Val
United Kingdom	10,830,944	$693,923	5,821,309	$379,959	4,735,379	$29
Belgium	3,892,905	219,356	3,164,978	202,445	1,852,157	11
Germany	4,756,433	281,432	3,087,386	171,461	1,621,357	9
France	7,001,308	396,696	7,878,416	471,467	1,321,665	8
Netherlands	2,764,156	172,423	3,588,545	228,076	1,137,586	7
Cuba	1,846,837	107,847	1,394,809	84,968	846,961	4
Mexico	570,881	36,028	995,479	63,924	578,446	3
Guatemala	462,148	30,704	834,801	58,419	610,589	4
Austria-Hungary	2,127,497	118,292	108,190	8,535	462,286	2
Chile	170,276	11,869	133,505	9,104	404,029	2
Italy	1,577,175	99,024	418,907	27,734	171,762	1
Russia in Europe	243,590	13,856	369,436	20,959	107,307	
Japan	871,430	56,248	415,077	27,412	99,305	
All other countries	2,335,839	150,348	2,375,422	155,976	1,864,002	12
Total	39,451,419	2,388,046	30,586,350	1,910,439	15,812,831	1,0

[1] Austria after 1919.

DOMESTIC EXPORTS—continued.

TABLE 6.—*Tallow*—Continued.

Exported to—	Fiscal year.			
	1915		1916	
	Pounds.	Value.	Pounds.	Value.
ingdom	7,898,548	$543,013	1,257,370	$102,281
	150,658	8,556		
	220	19		
	1,316,453	87,906	934,795	92,226
ds	1,083,948	88,489	320,267	27,585
	2,201,573	126,345	875,491	58,112
	704,303	42,376	1,398,295	101,317
a	314,848	20,049	187,678	16,802
	512,085	30,934	1,745,528	120,506
	1,432,652	105,602	4,652,446	390,588
	110,941	9,511	360,351	26,216
countries	500,214	36,459	235,849	16,028
al	4,013,525	287,186	4,320,673	374,811
	20,239,968	1,386,445	16,288,743	1,326,472

Exported to—	Fiscal year.			
	1917		1918	
	Pounds.	Value.	Pounds.	Value.
ingdom	157,171	$17,831	136,470	$33,005
	1,519,426	223,263	1,700,939	330,637
	1,223,622	134,300	1,593,808	275,968
	777,015	100,281	203,806	38,430
a	225,852	28,218	18,708	2,927
	93,820	11,609	77,360	16,491
	1,688,719	192,686	135,403	22,583
Europe	39,789	4,137		
	548,959	60,165	12	1
	109,090	16,909		
Asia	4,058,815	417,293		
countries	4,767,091	594,217	1,148,458	211,890
al	15,209,369	800,909	5,014,964	931,941

Exported to—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value.
ingdom	23,170	$3,885	4,663,847	$667,394
			5,478,257	912,091
			421,674	108,137
ds	2,276,518	407,502	10,603,756	1,787,882
			5,606,612	1,056,305
	975,143	158,711	1,983,768	241,018
	83,626	14,111	666,589	82,736
a	10,580	1,516	71,273	9,030
Hungary [1]			173,265	35,668
	72,500	15,700	1,190	184
Europe	133,604	23,382	46,344	8,510
			44,880	7,069
	12	1		
countries			3,263,474	487,916
tal	647,504	121,169	5,928,854	966,172
	4,222,657	745,977	38,953,783	6,370,112

[1] a after 1919.

DOMESTIC EXPORTS—continued.

TABLE 6.—*Tallow*—Continued.

Exported to—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	6,308,446	$782,788	1,937,539	$130,019
Belgium	444,200	79,402	1,311,776	106,687
Germany	1,362,417	218,481	2,181,779	197,497
France	998,152	177,394	1,557,873	161,274
Netherlands	2,942,308	454,140	3,037,205	228,633
Cuba	2,498,912	329,498	423,011	25,269
Mexico	2,669,637	367,839	1,731,748	116,659
Guatemala	56,017	7,503	71,608	4,931
Austria-Hungary [1]	143,047	14,303	.....	.....
Chile	320,182	59,813	.....	.....
Italy	378,363	52,724	253,061	19,296
Russia in Europe	.....	.....	106,536	7,760
Japan	2,760	340	200	30
Denmark	.....	.....	3,656	287
All other countries	2,567,197	406,450	1,181,936	81,461
Total	20,691,638	2,950,675	13,797,928	1,016,753

[1] Austria after 1919.

TABLE 7.—*Oleo oil and neutral lard.*[1]

Exported to—	Fiscal year.					
	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Netherlands	115,763,237	$9,591,108	96,112,544	$8,442,041	87,923,933	$7,886,839
Germany	37,959,599	3,152,001	40,311,979	3,314,884	40,922,348	3,682,339
United Kingdom	14,038,714	1,189,669	18,809,299	1,607,257	29,584,172	2,774,828
Norway	15,469,868	1,281,532	13,482,817	1,095,481	14,105,033	1,272,257
Denmark	7,125,738	645,862	10,308,596	951,677	18,735,972	1,778,337
Belgium	3,500,279	317,245	3,420,481	298,469	2,505,213	228,828
Turkey in Europe	3,118,223	226,791	4,205,630	321,153	5,807,826	508,259
Sweden	3,367,402	254,689	3,435,533	263,942	5,673,477	483,549
Newfoundland and Labrador	1,789,794	172,982	1,787,828	169,825	2,115,827	205,786
Turkey in Asia	270,992	19,930	708,659	57,179	1,834,744	164,320
Austria-Hungary	4,315,001	373,360	60,444	5,701	470,364	41,843
Italy	2,470,293	199,070	2,364,914	173,897	1,431,934	124,842
Canada	106,514	9,198	81,073	7,336	321,183	28,419
Greece	61,344	4,806	133,699	11,175	357,903	34,739
France	48,813	3,955	.....	.....	495,121	41,282
All other countries	162,264	13,778	113,680	9,916	256,087	25,796
Total	209,658,075	17,455,976	195,337,176	16,819,933	212,541,157	19,278,476

[1] Oleo of almost exclusive'y. Neutral lard not included after 1910.

DOMESTIC EXPORTS—continued.

TABLE 7.—*Oleo oil and neutral lard*—Continued.

Exported to—	Fiscal year. 1909		1910	
	Pounds.	Value.	Pounds.	Value.
.....	71,194,178	$7,609,208	47,115,136	$5,526,638
.....	40,404,633	4,219,425	29,792,155	3,433,843
gdom.....	35,040,691	3,789,344	21,147,116	2,357,158
.....	9,381,992	920,234	9,884,061	1,028,058
.....	12,402,401	1,419,644	6,883,607	818,126
.....	1,006,245	99,940	720,224	77,041
urope.....	2,734,826	251,036	3,123,725	281,383
nd and Labrador..	2,699,727	264,963	2,178,190	232,526
sia.....	2,186,765	268,254	2,526,391	289,916
gary.....	856,080	78,245	1,027,185	95,199
.....	133,000	13,300	9,500	957
.....	1,036,959	97,914	594,764	56,845
.....	83,616	9,219	.....	.....
.....	245,168	24,172	244,819	23,526
.....	65,625	7,481	9,375	1,200
ntries.....	513,340	54,362	835,427	82,917
.....	179,985,246	19,126,741	126,091,675	14,305,080

orted to—	Fiscal year. 1911		1912		1913	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
.....	67,690,748	$6,610,716	66,894,182	$7,157,862	46,337,137	$5,392,489
.....	28,571,311	2,847,346	18,042,333	1,910,286	17,480,760	2,054,694
gdom.....	9,255,210	944,842	9,959,942	1,059,546	8,008,915	904,101
.....	10,445,402	1,068,335	9,004,322	972,880	6,607,526	754,728
.....	7,544,755	730,301	4,894,296	563,993	4,972,834	629,162
urope.....	1,740,925	181,244	2,720,048	296,308	1,589,955	181,627
nd and Labrador..	5,718,352	517,806	4,949,860	441,966	2,191,729	224,072
sia.....	2,139,689	221,256	3,128,049	348,422	2,144,752	262,747
gary.....	1,532,214	154,224	1,712,058	192,653	1,371,781	174,483
.....	2,079,364	187,121	1,945,110	176,990	483,887	47,387
.....	298,657	29,868	865,913	87,362	640,014	71,861
.....	766,261	72,244	902,950	87,518	402,175	41,337
.....	.....	.....	.....	.....	53,626	5,957
.....	483,799	50,223	675,037	60,442	185,126	19,626
.....	.....	.....	300,490	30,446	.....	.....
ntries.....	430,219	43,236	472,534	47,344	379,540	101,982
.....	138,696,906	13,658,762	126,467,124	13,434,018	92,849,757	10,896,253

orted to—	Fiscal year. 1914		1915		1916	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
.....	47,414,421	$4,944,474	32,767,906	$3,637,839	29,762,451	$3,558,189
.....	16,180,268	1,631,254	1,001,252	98,081	.....	.....
gdom.....	9,243,952	1,010,834	14,361,603	1,734,445	30,657,569	3,684,779
.....	7,285,043	764,333	9,954,544	1,160,460	14,062,716	1,796,590
.....	5,445,882	580,692	13,459,913	1,669,389	6,614,373	790,640
.....	2,818,612	316,166	545,080	60,994	.....	.....
urope.....	2,619,195	257,478	451,334	42,330	.....	.....
nd and Labrador..	1,988,600	223,366	4,190,022	511,537	9,234,361	1,180,544
sia.....	1,244,121	141,759	1,029,540	120,474	1,896,196	230,463
gary.....	609,764	58,559	26,241	2,337	.....	.....
.....	572,759	59,375	20,800	2,080	.....	.....
.....	433,516	45,608	337,085	38,784	3,233,876	396,631
.....	338,613	39,021	226,228	28,025	37,338	5,233
.....	246,591	24,556	1,328,826	146,270	1,325,364	124,117
.....	392	39	380,943	45,868	3,872,410	480,181
ntries.....	575,336	59,151	400,629	42,275	1,949,260	221,748
.....	97,017,065	10,156,665	80,481,946	9,341,188	102,645,914	12,469,115

DOMESTIC EXPORTS—continued.

TABLE 7.—*Oleo oil and neutral lard*—Continued.

Exported to—	Fiscal year.			
	1917		1918	
	Pounds.	Value.	Pounds.	Value
Netherlands	8,081,795	$1,201,373		
United Kingdom	31,761,124	5,316,644	48,244,317	$10,184,
Norway	15,907,144	2,745,117	774,004	175,
Denmark	2,764,095	430,716	30,000	6,
Sweden	2,247,553	310,078	13,313	2,
Newfoundland and Labrador	1,761,149	294,394	1,623,929	378,
Italy	760,071	115,706	68,161	14,
Canada	475,952	85,137	4,346,560	1,030,
Greece	532,219	68,459	628,572	166,
France	2,199,170	391,141	412,147	106,
All other countries	619,839	106,254	462,355	109,
Total	67,110,111	11,065,019	56,603,388	12,152,

Exported to—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value
Netherlands			4,811,612	$1,367,
Germany			2,126,704	689,
United Kingdom	57,783,111	$12,782,449	20,791,549	6,113,
Norway			8,656,192	2,620,
Denmark	30,000	6,225	8,025,918	2,427,
Belgium			8,461,473	2,252,
Turkey in Europe			2,635,801	800,
Sweden	2,240,000	500,000	3,494,255	1,113,
Newfoundland and Labrador	2,081,016	520,516	1,890,493	547,
Turkey in Asia			395,088	129,
Austria-Hungary			619,924	171,
Italy	62,375	13,588	468,173	125,
Canada	5,409,619	1,307,061	1,377,794	375,
Greece	946,517	228,809	3,479,879	974,
France	205,445	45,648	4,589,290	1,343,
All other countries[1]	348,267	89,025	3,761,019	978,
Total	69,106,350	15,493,321	75,585,164	22,025,

Exported to—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value
Netherlands	20,107,202	$4,390,570	46,670,711	$5,094,
Germany	3,428,958	715,479	20,700,512	2,296,
United Kingdom	17,593,177	3,913,808	11,543,163	1,378,
Norway	10,566,827	2,389,285	18,040,180	2,220,
Denmark	1,531,297	321,766	3,172,458	386,
Belgium	1,030,628	206,628	1,512,145	181,
Turkey in Europe	6,801,573	1,556,259	9,235,697	1,009,
Sweden	3,320,805	755,460	3,783,541	447,
Newfoundland and Labrador	1,475,586	331,710	1,626,440	228,
Turkey in Asia	2,160,125	512,926	763,289	109,
Italy	386,181	81,426	735,812	69,
Canada	2,048,289	481,796	565,026	68,
Greece	2,706,173	670,232	2,349,273	316,
France	434,918	93,878	5,345,185	599,
All other countries[1]	773,605	163,986	1,934,281	232,
Total	74,368,344	16,585,209	127,977,713	14,617,

[1] *Includes* the following amounts to Switzerland: 1918—182,641 pounds, valued at $48,137; 1919—3,45 *pounds, valued at* $895,999; 1920—93,597 pounds, valued at $16,133; 1921—202,225 pounds, valued at $23,

GENERAL IMPORTS, 1906–1921.

TABLE 8.—*Cattle.*

Imported from—	Fiscal year.					
	1906		1907		1908	
	Number.	Value.	Number.	Value.	Number.	Value.
FREE.						
Mexico					2,197	$26,626
Canada	358	$54,134	326	$49,897	362	33,814
United Kingdom	441	60,997	468	62,780	629	88,702
All other countries	30	3,237	41	9,553		
Total	829	118,368	835	122,230	3,188	149,142
DUTIABLE.						
Mexico	23,838	315,603	27,112	355,409	63,619	865,342
Canada	4,188	99,946	4,427	81,739	25,537	492,617
United Kingdom	88	9,551	28	5,744	2	80
All other countries	76	4,962			10	129
Total	28,190	430,062	31,567	442,892	89,168	1,358,168
TOTAL FREE AND DUTIABLE.						
Mexico	23,838	315,603	27,112	355,409	65,816	891,968
Canada	4,546	154,080	4,753	131,636	25,899	526,431
United Kingdom	529	70,548	496	68,524	631	88,782
All other countries	106	8,199	41	9,553	10	129
Total	29,019	548,430	32,402	565,122	92,356	1,507,310

Imported from—	Fiscal year.					
	1909		1910		1911	
	Number.	Value.	Number.	Value.	Number.	Value.
FREE.						
Mexico	2,002	$23,286	27	$1,450	246	$2,803
Canada	402	54,847	406	42,966	354	71,228
United Kingdom	632	61,218	2,178	246,723	1,821	285,950
All other countries	13	1,362			20	2,239
Total	3,049	140,713	2,611	291,139	2,441	362,220
DUTIABLE.						
Mexico	126,067	1,683,756	188,114	2,594,796	177,735	2,517,533
Canada	10,061	174,064	5,168	109,772	2,689	65,131
United Kingdom	3	235	42	3,944	58	8,193
All other countries	4	654	3	173		
Total	136,135	1,858,709	193,327	2,708,685	180,482	2,590,857
TOTAL FREE AND DUTIABLE.						
Mexico	128,069	1,707,042	188,141	2,596,246	177,981	2,520,336
Canada	10,463	228,911	5,574	152,738	3,043	136,359
United Kingdom	635	61,453	2,220	250,667	1,879	294,143
All other countries	17	2,016	3	173	20	2,239
Total	139,184	1,999,422	195,938	2,999,824	182,923	2,953,077

GENERAL IMPORTS—continued.

TABLE 8.—*Cattle*—Continued.

Imported from—	Fiscal year.					
	1912		1913		1914	
	Number.	Value.	Number.	Value.	Number.	Value.
FREE.						
Mexico	40	$680			519,481	$8,237,628
Canada	309	51,367	425	$54,697	197,087	7,737,147
United Kingdom	1,780	253,175	963	179,792	1,784	254,039
Total	2,129	305,222	1,388	234,489	718,352	16,328,814
DUTIABLE.[1]						
Mexico	315,187	4,463,917	391,477	5,430,259	105,772	1,467,965
Canada	1,041	35,004	28,761	971,604	44,244	958,964
United Kingdom	15	1,431	18	2,616		
All other countries			5	1,700		
Total	316,243	4,500,352	420,261	6,406,179	150,016	2,367,898
TOTAL FREE AND DUTIABLE.						
Mexico	315,227	4,464,597	391,477	5,430,259	625,253	9,745,593
Canada	1,350	86,371	29,186	1,026,301	241,331	8,697,137
United Kingdom	1,795	254,606	981	182,408	1,784	254,039
All other countries			5	1,700		
Total	318,372	4,805,574	421,649	6,640,668	868,368	18,696,769

Imported from—	Fiscal year.					
	1915		1916		1917	
	Number.	Value.	Number.	Value.	Number.	Value.
FREE.						
Mexico	346,004	$8,088,684	197,788	$4,084,271	183,827	$4,201,987
Canada	191,540	9,285,277	238,025	10,850,214	189,285	8,498,113
United Kingdom	623	139,214	1,161	191,170	1,714	321,139
All other countries			2,341	61,938		
Total	538,167	17,513,175	439,185	15,187,593	374,826	13,021,239

Imported from—	Fiscal year.			
	1918		1919	
	Number.	Value.	Number.	Value.
FREE.				
Mexico	105,470	$3,070,066	82,340	$2,462,217
Canada	185,089	14,377,487	356,834	34,292,699
United Kingdom	1,063	292,007	695	236,699
Virgin Islands	112	6,883	530	34,493
All other countries	1,985	105,733		
Total	293,719	17,852,176	440,399	36,995,921

[1] Figures for 1914 cover period from July 1 to Oct. 3, 1913, inclusive.

GENERAL IMPORTS—continued.

TABLE 8.—*Cattle*—Continued.

Imported from—	Fiscal year.			
	1920		1921	
	Number.	Value.	Number.	Value.
FREE.				
	82,760	$2,558,789	19,174	$518,057
	489,690	41,865,349	304,532	22,318,378
gdom	1,301	588,025	1,650	706,602
ds	1,577	69,016	858	46,087
	575,328	45,081,179	326,214	23,589,124
DUTIABLE.				
			1,010	13,130
			2,750	32,107
			3,760	45,237
TOTAL FREE AND DUTIABLE.				
	82,760	2,558,789	20,184	531,187
gdom	489,690	41,865,349	307,282	22,350,485
ds	1,301	588,025	1,650	706,602
	1,577	69,016	858	46,087
	575,328	45,081,179	329,974	23,634,361

Imported from—	Calendar year.			
	1918		1919	
	Number.	Value.	Number.	Value.
FREE.				
	100,632	$2,917,027	90,541	$2,724,419
	249,316	22,317,247	550,004	50,276,054
gdom	404	162,623	806	251,899
ds	264	15,955	1,044	43,706
untries	1,985	105,733		
	352,601	25,518,585	642,395	53,296,078

Imported from—	Calendar year.			
	1920		1921	
	Number.	Value.	Number.	Value.
FREE.				
	58,926	$1,847,851	9,100	$191,473
	316,559	24,491,888	65,963	3,274,287
gdom	2,113	1,006,653	973	379,006
ds	1,516	72,212	614	27,732
	379,114	27,418,604	76,650	3,872,498
DUTIABLE.[1]				
			4,774	63,118
			113,445	2,196,975
intries			2	15
			118,221	2,260,108
TOTAL FREE AND DUTIABLE.				
	58,926	1,847,851	13,874	254,591
	316,559	24,491,888	179,408	5,471,262
gdom	2,113	1,006,653	973	379,006
ds	1,516	72,212	614	27,732
untries			2	15
	379,114	27,418,604	194,871	6,132,606

o Dec. 31, 1921.

GENERAL IMPORTS—continued.

TABLE 9.—*Fresh beef and veal.*

FREE.[1]

Imported from—	Fiscal year.					
	1914		1915		1916	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Argentina	59,585,005	$5,188,927	130,680,021	$12,064,195	52,680,436	$5,240,[illegible]
United Kingdom	56,518,878	4,962,398	8,676,776	779,258	----------	----------
Uruguay	25,902,732	2,209,594	13,802,565	1,173,293	192,229	18,[illegible]
Australia and Tasmania	18,232,714	1,392,493	10,482,128	838,900	----------	----------
Canada	15,071,444	1,309,362	15,305,264	1,575,637	9,918,326	1,000,[illegible]
New Zealand	808,950	63,117	1,602,250	126,329	5,080	[illegible]
Mexico	212,865	14,114	3,941,131	384,497	1,316,698	127,[illegible]
Brazil	----------	----------	----------	----------	6,988,978	722,[illegible]
All other countries	484	168	624	56	----------	----------
Total	176,333,072	15,140,173	184,490,759	16,942,661	71,101,756	7,107,[illegible]

Imported from—	Fiscal year.			
	1917		1918	
	Pounds.	Value.	Pounds.	Value.
Argentina	2,295,690	$203,331	431,041	$57,[illegible]
Uruguay	86,662	8,452	13,120	2,[illegible]
Australia and Tasmania	201,641	21,207	569,053	80,[illegible]
Canada	9,435,742	1,054,852	20,768,167	3,104,[illegible]
New Zealand	12,949	1,313	----------	----------
Brazil	3,184,084	323,917	1,507,719	134,[illegible]
All other countries	350	18	[2] 2,162,555	273,[illegible]
Total	15,217,118	1,613,090	25,451,655	3,651,[illegible]

Imported from—	Calendar year.			
	1918		1919	
	Pounds.	Value.	Pounds.	Value.
Argentina	2,621,124	$867,034	261,001	$43,[illegible]
Uruguay	16,438	2,937	94,426	19,[illegible]
Australia and Tasmania	268,536	37,778	1,528,138	171,[illegible]
Canada	14,910,005	2,552,352	31,124,474	5,416,[illegible]
New Zealand	----------	----------	97	[illegible]
Mexico	158	40	1,542	[illegible]
All other countries [3]	5,522,770	699,045	5,452,080	754,[illegible]
Total	23,339,081	4,159,186	38,461,758	6,408,[illegible]

[1] Figures cover period since Oct 3, 1913.

[2] Includes the following: Panama, 1,603,980 pounds, valued at $220,437; China, 307,231 pounds, valued at $29,203; Philippines, 251,344 pounds, valued at $23,879.

[3] Includes the following amounts: Panama, 1918—4,454,760 pounds, valued at $595,929; China, 562,[illegible] pounds, valued at $54,404; Philippines, 505,523 pounds, valued at $54,404; 1919—Panama, 5,164,867 pounds, valued at $722,635; Philippines, 285,359 pounds, valued at $31,243; 1920—Panama, 3,783,479 pounds, valued at $566,274.

GENERAL IMPORTS—continued.

TABLE 9.—*Fresh beef and veal*—Continued.

FREE—Continued.

Imported from—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
	2,428,393	$441,223	799,682	$139,576
gdom	19,655	1,850		
	1,090,284	184,896	410,475	59,088
id Tasmania	2,444,431	286,709	1,067,436	138,693
	37,488,425	6,280,030	9,728,273	1,383,743
id	2,923,105	295,776	1,022,687	98,371
	1,305	199	2,231	267
			235,000	89,452
untries [1]	3,786,507	566,687	751	292
	50,182,105	8,057,270	13,266,535	1,909,482

DUTIABLE.

Imported from—	Fiscal year.			
	1914 [2]		1921 [3]	
	Pounds.	Value.	Pounds.	Value.
	189,932	$8,024	251,280	$19,147
gdom	1,021,097	94,762		
			45,344	3,491
id Tasmania	1,625,812	113,472	125,322	11,094
	848,355	58,751	16,740,847	1,844,133
id	50,098	3,781	1,946,639	157,152
	68,817	4,948	481	69
untries			1,474	160
	3,804,111	283,738	19,111,387	2,035,246

the following amounts: Panama, 1918—4,454,760 pounds, valued at $595,929; China, 562,487 ued at $54,404; Philippines, 505,523 pounds, valued at $54,404; 1919—Panama, 5,164,867 pounds, 22,635; Philippines, 285,359 pounds, valued at $31,243; 1920—Panama, 3,783,479 pounds, valued

for Jan. 1 to May 27.
for July 1 to Oct. 3, 1913.
for May 28 to Dec. 31.

GENERAL IMPORTS—continued.

TABLE 9.—*Fresh beef and veal*—Continued.

TOTAL FREE AND DUTIABLE.

Imported from—	Fiscal year.			
	1914		1915	
	Pounds.	Value.	Pounds.	Value.
Argentina	59,774,951	$5,196,951	130,680,021	$12,064,195
United Kingdom	57,539,975	5,057,160	8,676,776	779,234
Uruguay	25,902,732	2,209,594	13,802,565	1,173,289
Australia and Tasmania	19,858,526	1,505,965	10,482,128	828,909
Canada	15,919,799	1,368,113	15,305,264	1,375,633
New Zealand	859,048	66,898	1,602,250	126,529
Mexico	281,682	19,062	3,941,131	384,497
All other countries	484	168	624	56
Total	180,137,183	15,423,911	184,490,759	16,942,861

Imported from—	Fiscal year.			
	1916		1921	
	Pounds.	Value.	Pounds.	Value.
Argentina	52,680,436	$5,240,834	1,050,962	$158,723
Uruguay	192,229	16,151	455,819	62,579
Australia and Tasmania			1,192,758	149,787
Canada	9,918,326	1,000,230	26,469,120	3,227,976
New Zealand	5,089	516	2,909,326	255,525
Mexico	1,316,698	127,800	2,712	338
Brazil	6,988,978	722,418	235,000	89,452
All other countries			2,225	452
Total	71,101,756	7,107,949	32,377,922	3,944,728

TABLE 10.—*Bologna sausage (free).*

Imported from—	Fiscal year.					
	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany	363,730	$381,542	324,418	$97,549	395,446	$98,589
Italy	310,176	58,559	63,121	13,727	45,424	9,080
Netherlands	26,771	3,012	22,552	2,592	44,195	6,789
Denmark	45	7	3,100	542	10,818	1,033
Spain	18,920	2,405	10,202	1,646	2,784	338
Canada	50	10	340	78	556	99
Hongkong	11,951	1,337			140	14
All other countries	12,991	2,721	27,236	5,071	21,407	4,262
Total	744,634	149,593	451,059	121,205	520,770	108,367

Imported from—	Fiscal year.					
	1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany	456,554	$115,565	454,575	$112,992	559,993	$119,496
Italy	7,857	1,397	7,048	1,457	11,211	2,469
Netherlands	70,721	8,109	48,282	6,042	56,842	10,748
Denmark	14,126	1,694	25,300	2,820	26,533	3,573
Spain	112	30	6,850	1,158	15	19
Canada	500	80	300	72		
Hongkong			1,188	120		
Mexico			15	3		
All other countries	11,003	2,693	11,966	2,610	12,394	3,590
Total	560,873	129,568	555,524	127,274	666,988	140,535

GENERAL IMPORTS—continued.

TABLE 10.—*Bologna sausage (free)*—Continued.

Imported from—	Fiscal year.					
	1912		1913		1914	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
ermany	619,310	$137,565	530,060	$131,404	594,551	$155,156
aly	6,120	1,534	3,824	944	60,541	16,642
etherlands	33,832	5,257	26,659	6,082	32,382	5,266
enmark	34,023	5,181	13,709	2,568	7,006	1,393
ain			1,320	428	11,200	2,838
nada					5,785	488
ongkong					2,787	623
exico	263,852	29,710	143,646	13,618		
l other countries	14,638	3,735	9,251	2,827	16,076	4,418
Total	971,775	182,982	728,469	157,871	730,326	186,824

Imported from—	Fiscal year.							
	1915		1916		1917		1918	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
rmany	72,866	$17,466						
aly	92,380	27,855	12,053	$4,260				
etherlands	12,080	1,652	5,625	1,424				
nmark	5,620	1,092						
ain	420	151	171	116	528	$230	1,240	$499
nada	5,700	1,001	16,614	3,415			12,626	4,610
ongkong	12,053	2,501	4,666	1,220				
l other countries	8,365	1,942	8,158	1,888	154	44	1,190	555
Total	209,484	53,660	47,287	12,323	682	274	15,056	5,664

Imported from—	Calendar year.							
	1918		1919		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
aly					57,857	$23,557	23,367	$10,528
etherlands			40	$23	70	20		
nmark					324	101	518	154
ain	1,631	$723	9,421	4,863	18,091	12,204	4,019	2,440
nada	1,050	324	5,366	888	26,310	3,853	139	21
ongkong	640	328	56,453	37,264	49,258	29,802	24,826	10,361
l other countries	2,096	1,422	452	302	4,825	4,459	3,921	1,567
Total	5,417	2,797	71,732	43,340	156,735	73,996	56,790	25,071

TABLE 11.—*Stearin from animal fats (dutiable).*

Imported from—	Fiscal year.					
	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
nited Kingdom	733,267	$58,143	705,710	$61,676	512,978	$43,548
rance	585,349	45,640	436,794	30,558	77,363	6,206
aly	120,349	13,165				
etherlands	10,204	538				
ustria Hungary	218,192	14,237				
l other countries	32,816	2,473	41,783	1,151	844,504	85,985
Total	1,700,177	134,196	1,184,287	93,385	1,434,845	135,739

GENERAL IMPORTS—continued.

TABLE 11.—*Stearin from animal fats (dutiable)*—Continued.

Imported from—	Fiscal year.			
	1909		1910	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	687,538	$67,560	32,714	$3,298
France	91,378	8,990	50,584	5,205
Italy	418,874	41,548	88,184	9,722
Netherlands	2,573,892	281,982	265,029	30,288
Austria-Hungary	26,503	2,357	1,000	220
All other countries	96,869	9,048	22,416	2,437
Total	3,895,254	411,485	459,927	51,290

Oleo stearin (free).[1]

Imported from—	Fiscal year.					
	1910		1911		1912	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Argentina	17,182	$1,758	1,974,180	$180,066	1,349,286	$112,708
United Kingdom	1,460,012	179,505	760,741	78,938	1,034,125	92,077
France	1,334,762	164,292	665,317	70,264	682,844	66,602
Italy	1,205,607	121,688	771,347	80,643	612,430	57,483
Australia			24,912	2,039	150,961	11,664
Netherlands	3,234,469	380,596	716,048	79,533	760,196	83,551
Austria-Hungary	110,800	13,485	795,963	99,840	257,248	23,728
All other countries	321,726	40,014	6,840	796	66,000	4,987
Total	7,684,558	901,338	5,715,348	592,119	4,913,090	448,950

Imported from—	Fiscal year.					
	1913		1914		1915	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Argentina	2,419,057	$257,073	2,136,097	$185,596	1,916,140	$164,657
United Kingdom	2,054,401	212,729	1,071,546	92,831		
France	1,180,601	120,275	867,723	76,715		
Italy	1,710,135	166,070	610,932	55,167		
Australia	315,705	26,285	244,216	19,880	231,717	15,976
Netherlands	273,476	27,152	162,225	15,282		
Austria-Hungary	1,465,637	149,407	133,227	12,896		
All other countries	92,122	8,009	17,587	1,672	276,143	28,912
Total	9,511,134	967,000	5,243,553	459,989	2,424,000	209,545

Imported from—	Fiscal year.					
	1916		1917		1918	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Argentina	616,422	$54,763	924,536	$82,269	5,474,722	$931,702
United Kingdom			1,000	170		
Australia	69,289	6,253			10	2
All other countries	224,767	20,264	187,741	32,201	1,100,647	186,718
Total	910,478	81,280	1,113,277	114,640	6,575,379	1,118,422

[1] Free on and after Aug. 6, 1909; figures for 1910 cover period from July 1 to Aug. 5, 1909, inclusive. (See Stearin from Animal Fats.)

GENERAL IMPORTS—continued.

TABLE 11.—*Oleo stearin (free)*—Continued.

Imported from—	Calendar year.							
	1918		1919		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Argentina	1,347,785	$216,411	1,956,398	$372,137	508,160	$99,085	364,944	$28,133
United Kingdom					40,161	5,751	11,309	1,120
France			112,000	29,120				
Australia	10	2					13,440	1,500
All other countries	208,986	33,709	290,048	73,899	414,336	75,754	29,015	2,042
Total	1,556,781	250,122	2,358,446	475,156	962,657	180,590	418,708	32,795

Total oleo stearin (free) and stearin from animal fats (dutiable).

Imported from—	Fiscal year.					
	1909		1910		1911	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Argentina			17,182	$1,758	1,974,180	$180,066
United Kingdom	687,538	$67,560	1,492,726	182,803	760,741	78,938
France	91,578	8,990	1,385,346	169,597	665,317	70,264
Italy	418,874	41,548	1,293,791	131,410	771,347	80,643
Australia					24,912	2,039
Netherlands	2,573,892	281,982	3,499,498	410,884	716,048	79,533
Austria-Hungary	26,503	2,357	111,800	13,705	795,963	99,840
All other countries	96,869	9,048	344,142	42,471	6,840	796
Total	3,895,254	411,485	8,144,485	952,628	5,715,348	592,119

TABLE 12.—*Tallow (free).*

Imported from—	Calendar year.			
	1918[1]		1919	
	Pounds.	Value.	Pounds.	Value.
New Zealand	4,061,912	$515,467	3,277,844	$510,081
Australia	827,890	104,696	875,397	152,753
Canada	287,741	54,318	3,487,417	481,249
China	217,812	27,591	260,390	43,523
Argentina			3,377,728	490,826
Uruguay			707,500	117,637
All other countries	50	3	109,913	16,834
Total	5,395,405	5,702,075	12,096,189	1,812,903

Imported from—	Calendar year.			
	1920		1921	
	Pounds.	Value.	Pounds.	Value.
New Zealand	8,253,979	$1,045,982		
Australia	2,434,158	290,130	1,538	$133
Canada	1,002,216	93,872	410,177	23,346
China	138,469	20,846		
Argentina	1,851,895	239,367	728,962	42,997
Uruguay	311,048	42,115	776	110
All other countries	882,872	109,434	728,959	39,281
Total	14,874,637	1,841,746	1,870,412	105,867

[1] Figures for July 1 to Dec. 31.

IMPORTS FOR CONSUMPTION.

TABLE 13.—*Cattle.*

ACTS OF 1897 AND 1909.

Fiscal year.	Rate of duty.	Number.	Value.	Duty collected.	Value per unit of quantity.	Average ad valorem rate.
	Less than 1 year old.					*Per cent.*
1906	$2 per head	6,023	$58,365	$12,046	$9.69	20.64
1907	do	6,644	77,738	13,288	11.70	17.09
1908	do	14,157	133,472	28,314	9.42	21.21
1909	do	28,081	249,110	56,162	8.87	22.55
1910	do	23,824	229,136	47,648	9.62	20.79
1911	do	21,993	194,392	43,986	8.84	22.63
1912	do	34,299	326,256	68,598	9.51	21.03
1913	do	63,869	578,521	127,738	9.06	22.08
1914	do	26,281	265,779	52,562	10.12	19.78
	1 year old or over—Valued at not more than $14 per head.					
1906	$3.75 per head	14,921	202,601	55,954	13.58	27.62
1907	do	15,246	198,617	57,172	13.03	28.79
1908	do	42,831	573,637	160,616	13.39	27.99
1909	do	68,804	931,377	258,015	13.54	27.70
1910	do	108,269	1,478,113	406,008	13.65	27.47
1911	do	85,717	1,168,439	321,438	13.63	27.51
1912	do	172,214	2,341,575	645,802	13.60	27.58
1913	do	199,868	2,512,979	749,505	12.57	29.83
1914	do	54,619	728,161	204,821	13.33	28.13
	1 year old or over—Valued at more than $14 per head.					
1906	27½ per cent	6,537	144,962	39,865	22.18	27.50
1907	do	8,748	152,783	42,015	17.46	27.50
1908	do	32,094	639,345	175,820	19.92	27.50
1909	do	40,193	673,093	185,100	16.75	27.50
1910	do	61,538	992,921	273,053	16.13	27.50
1911	do	72,753	1,225,141	336,914	16.84	27.50
1912	do	109,489	1,818,474	500,081	16.60	27.50
1913	do	160,076	3,226,967	887,416	20.16	27.50
1914	do	54,091	1,132,012	311,303	20.93	27.50

ACT OF 1913.

1914	Free	736,562	$16,450,434		$22.46	
1915	do	539,361	17,546,085		32.53	
1916	do	447,152	15,342,135		34.31	
1917	do	373,686	13,021,259		34.84	
1918	do	294,207	17,801,579		60.51	

	Unit of quantity.	Rate of duty.	Number.	Value.	Duty.
Calendar year 1918:					
Cattle	Number	Free	[1] 108,432	$4,150,791	
Bulls	do	do	[2] 4,198	178,356	
Cows, dairy or milch	do	do	[2] 2,692	252,671	
All other	do	do	[2] 237,867	20,588,770	
Total	do	do	353,189	25,170,588	
Calendar year 1919:					
Bulls	do	do	8,000	457,897	
Cows, dairy or milch	do	do	13,840	1,050,509	
All other	do	do	620,555	51,787,672	
Total	do	do	642,395	53,296,078	
Calendar year 1920:					
Bulls	do	do	3,302	480,668	
Cows, dairy or milch	do	do	4,479	854,717	
All other	do	do	371,333	26,083,219	
Total	do	do	379,114	27,418,604	
Calendar year 1921:					
Cattle	do	30 per cent	[3] 118,219	2,244,941	$673,482
Cattle from Virgin Islands	do	Free	234	7,766	
Bulls	do	do	587	86,914	
Cows, dairy or milch	do	do	984	360,375	
All other	do	do	74,845	3,417,443	
Total	do		194,869	6,117,439	673,482

[1] Jan. 1 to June 30, 1918. [2] July 1 to Dec. 31, 1918. [3] Emergency tariff act, May 28 to Dec. 31, 1921.

IMPORTS FOR CONSUMPTION—continued.

TABLE 14.—*Fresh beef.*

UNDER GENERAL TARIFF.

	Rate of duty.	Quantity.	Value.	Duty collected.	Value per unit of quantity.	Actual and computed ad valorem rate.
Fiscal year:		*Pounds.*				*Per cent.*
1906	2 cents per pound	269,602	$28,233	$5,392	$0.105	19.10
1907	Duty remitted, sec. 14, act July 24, 1897.	25,713	1,649		.064	
1908	2 cents per pound	187,562	24,822	3,751	.132	15.11
1909	do	169,281	18,039	3,385	.107	18.76
1910	do	17,843	2,863	356	.161	12.46
	1½ cents per pound	634,434	41,671	9,516	.066	22.84
1911	do	374,427	21,669	5,616	.058	25.88
1912	do	1,019,995	77,707	15,300	.076	19.69
1913	do	3,957,700	303,934	59,365	.077	19.53
1914	do	3,633,094	270,467	54,496	.074	20.15
	Free	171,945,267	14,762,866		.086	
1915	do	182,829,376	16,772,258		.092	
1916	do	70,383,784	7,039,852		.100	
1917	do	14,399,354	1,462,294		.102	
1918	do	24,781,719	3,495,112		.141	
Calendar year:						
1918	do	22,501,954	3,974,092		.176	
1919	do	33,588,241	5,394,609		.161	
1920	do	40,520,057	6,160,993		.152	
1921	do [1]	11,628,364	1,673,148		.144	
	2 cents per pound [2]	16,742,033	1,745,721	334,841	.104	19.18

FROM CUBA (RECIPROCITY TREATY, DECEMBER 27, 1903).

Fiscal year:						
1909	2 cents per pound less 20 per cent.	338	$20	$5	$0.060	27.05
1910	1½ cents per pound less 20 per cent.	246,394	14,530	2,956	.059	20.35
1911	do	132	16	1	.121	9.88

DUTY REMITTED.

Fiscal year:						
1908	Sec. 14, act of July 24, 1897.	20,166	$1,361		$0.067	
1909	do	21,793	1,547		.071	
1910	Sec. 21, act of Aug. 5, 1909.	24,706	2,045		.083	
1913	do	192,439	11,440		.059	
1914	Sec. IV, K, act of Oct. 3, 1913.	161,794	11,631		.072	

[1] Old law, Jan. 1 to May 27, 1921. [2] Emergency tariff law, May 28 to Dec. 31, 1921.

TABLE 15.—*Fresh veal.*

	Rate of duty.	Quantity.	Value.	Duty collected.	Ad valorem rate of duty.
Fiscal year:		*Pounds.*			*Per cent.*
1906	2 cents per pound	33,115	$3,476	$662	19.05
1907	do	59,405	7,179	1,188	16.55
1908	do	55,971	7,035	1,119	15.91
1909	do	9,205	1,371	184	13.43
1910	1½ cents per pound	23,807	2,346	357	15.22
1911	do	7,250	1,512	108	7.19
1912	do	3,102	852	46	5.46
1913	do	78,625	7,193	1,179	16.40
1914	do	96,882	8,201	1,453	17.72
	Free	2,550,270	220,282		
1915	do	1,690,332	171,405		
1916	do	508,703	67,786		
1917	do	821,875	150,808		
1918	do	917,696	188,660		
Calendar year:					
1918	do	939,121	199,353		
1919	do	4,873,515	1,013,472		
1920	do	9,662,048	1,896,277		
1921	do	1,638,171	236,334		
1921 [1]	2 cents per pound	2,369,354	289,525	47,387	16.37

[1] Emergency tariff law, May 28 to Dec. 31, 1921.

IMPORTS FOR CONSUMPTION—continued.

TABLE 15.—*Fresh veal*—Continued.

DUTY REMITTED.

Fiscal year:					
1908	Sec. 14, act July 24, 1897	1,074	$99		
1910	Sec. 21, act Aug. 5, 1909	1,900	209		

TABLE 16.—*Corned beef, canned.*

	Rate of duty.	Quantity.	Value.	Duty.
Fiscal year:		*Pounds.*		
1914	Free		$1,004,468	
1915	do		610,786	
1916	do		118,667	
1917	do		732,351	
1918	do		6,752,927	
Calendar year:				
1918	do		36,673,220	
1919	do	16,731,826	4,753,298	
1920	do	3,979,073	814,790	
1921	do [1]	191,309	31,387	
	25 per cent [2]	128,243	14,816	$3,704

[1] Jan. 1 to May 27, 1921.
[2] Emergency tariff act May 28 to Dec. 31, 1921.

TABLE 17.—*Meat extract.*

FLUID.

	Rate.	Quantity.	Value.	Duty.	Equivalent ad valorem.
Fiscal year:		*Pounds.*			*Per cent.*
1906	15 cents per pound	31,144	$20,768	$4,672	22.49
1907	do	19,772	13,702	2,906	21.65
1908	do	9,525	8,275	1,429	17.26
1909	do	2,883	2,011	432	21.50
1910	do	2,595	2,931	389	13.28
1911	do	6,633	3,470	995	28.67
1912	do	27,472	13,842	4,121	29.77
1913	do	29,091	11,096	4,364	39.33
1914	do	969	1,068	145	13.61
	5 cents per pound	2,799	2,888	140	4.85
1915	do	3,738	4,428	187	4.22
1916	do	172	264	9	3.26
1917	do	1,990	3,632	99	2.74
1918	do	12	22	1	2.73
Calendar year:					
1918	do	43	71	2	3.03
1919	do	13,000	17,342	650	3.75
1920	do	2,542	2,367	127	5.37
1921	do	139	168	7	4.14

ALL OTHER, N. S. P. F.

Fiscal year:					
1906	35 cents per pound	85,608	$160,097	$29,963	18.72
1907	do	107,924	201,869	37,773	18.71
1908	do	50,331	90,620	17,616	19.44
1909	do	78,067	122,978	27,323	22.22
1910	do	94,525	148,467	33,084	22.28
1911	do	163,812	209,106	57,334	27.42
1912	do	154,354	192,012	54,024	28.14
1913	do	106,312	138,489	37,209	26.87
1914	do	11,703	16,145	4,096	25.37
	10 cents per pound	118,969	182,042	11,897	6.54
1915	do	97,656	139,936	9,765	6.98
1916	do	78,614	100,652	7,861	7.81
1917	do	93,108	155,766	9,311	5.98
1918	do	1,401	1,411	140	9.93
Calendar year:					
1918	do	5,585	8,747	558	6.39
1919	do	12,003	11,246	1,200	10.67
1920	do	62,592	43,990	6,259	14.23
1921	do	67,416	49,463	6,742	13.63

IMPORTS FOR CONSUMPTION—continued.

TABLE 18.—*Livers, sweetbreads, etc., of beef, pork, and mutton.*

	Rate of duty.	Quantity.	Value.	Value per unit of quantity.
Fiscal year:		*Pounds.*		
1914	Free	2,575,810	$188,941	$0.073
1915	do		1,165,989	
1916	do		671,444	
1917	do		158,719	
1918	do		169,927	
Calendar year:				
1918	do		165,837	
1919	do	3,532,074	302,256	.086
1920	do	3,389,507	412,358	.121
1921	do	763,578	112,544	.147

TABLE 19.—*Sausage, bologna.*

	Rate of duty.	Quantity.	Value.	Duty collected.	Value per unit of quantity.	Actual and computed ad valorem rate.
Fiscal year:		*Pounds.*				*Per cent.*
1906	Free	752,458	$149,310		$0.198	
1907	do	450,762	121,124		.269	
1908	do	520,744	108,363		.208	
1909	do	560,955	129,573		.231	
1910	do	580,236	129,809		.224	
1911	do	907,478	283,902		.247	
1912	do	993,495	182,981		.184	
1913	do	723,901	156,683		.216	
1914	do	763,097	189,957		.249	
1915	do	210,543	53,375		.254	
1916	do	47,389	12,322		.260	
1917	do	789	318		.403	
1918	do	15,056	5,664		.376	
Calendar year:						
1918	do	5,417	2,797		.516	
1919	do	71,722	43,340		.604	
1920	do	156,735	73,996		.472	
1921	do[1]	56,790	25,071		.441	
	25 per cent[2]	84,928	34,596	$8,649	.407	25

[1] Jan. 1 to May 27. [2] Emergency tariff act, May 28 to Dec. 31, 1921.

TABLE 20.—*Oleo stearin.*

	Rate of duty.	Quantity.	Value.	Duty collected.	Value per unit of quantity.	Average ad valorem rate.
Fiscal year:		*Pounds.*				*Per cent.*
1906	20 per cent	1,669,785	$125,456	$25,091	$0.075	20
1907	do	1,162,303	109,852	21,970	.095	20
1908	do	1,317,451	121,238	24,247	.092	20
1909	do	4,104,098	419,359	83,871	.102	20
1910	do	404,888	45,344	9,068	.112	20
	Free	8,922,977	930,160		.104	
1911	do	5,705,462	591,072		.104	
1912	do	4,912,710	448,950		.091	
1913	do	9,540,347	967,000		.101	
1914	do	5,679,535	497,973		.088	
1915	do	2,644,490	226,661		.086	
1916	do	910,478	81,280		.089	
1917	do	1,113,277	114,640		.103	
1918	do	6,575,379	1,118,413		.170	
Calendar year:						
1918	do	1,556,781	250,122		.161	
1919	do	2,358,206	475,156		.201	
1920	do	962,657	180,590		.188	
1921	do	418,708	32,795		.077	

IMPORTS FOR CONSUMPTION—continued.

TABLE 21.—*Tallow.*

	Rate of duty.	Quantity.	Value.	Duty collected.	Value per unit of quantity.	Average ad valorem rate.
Fiscal year:		*Pounds.*				*Per cent.*
1906	¾ cent per pound	908,259	$63,805	$6,812	$0.070	10.68
1907	do	421,305	29,733	3,160	.071	10.62
1908	do	304,765	23,074	2,285	.075	9.90
1909	do	364,964	28,299	2,737	.078	9.67
1910	do	117,464	7,081	880	.060	12.43
	½ cent per pound	794,008	61,402	3,970	.077	6.46
1911	do	984,383	81,640	4,921	.083	6.03
1912	do	347,837	25,595	1,739	.074	6.79
1913	do	488,607	41,562	2,443	.085	5.88
1914	do	365,440	32,005	1,827	.088	5.71
	Free	3,005,393	199,919		.066	
1915	do	12,634,594	823,958		.065	
1916	do	4,779,076	396,787		.083	
1917	do	31,136,527	3,108,274		.099	
1918	do	98,176,560	14,365,676		.146	
Calendar year:						
1918	do	51,885,808	7,444,230		.143	
1919	do	12,096,189	1,812,903		.149	
1920	do	14,874,637	1,841,746		.123	
1921	do	1,870,412	105,867		.056	
FROM CUBA (RECIPROCITY TREATY, DECEMBER 27, 1903).						
Fiscal year:						
1907	¾ cent per pound, less 20 per cent.	3,570	192	21	.054	11.16
1912	½ cent per pound, less 20 per cent.	1,544	107	6	.069	5.78
1913	do	1,898	147	7	.077	5.17

DOMESTIC SLAUGHTERINGS OF ANIMALS, AND PRODUCTION OF MEATS.[1]

TABLE 22.—*Number of animals slaughtered annually under Federal inspection, and estimated number slaughtered otherwise (including farm) in the United States.*

Calendar year.	Cattle.	Calves.	Sheep and lambs.	Goats.	Swine.
1907—Federally inspected	7,633,365	2,024,387	10,232,070	56,750	32,885,377
Total	13,469,900	6,026,800	13,300,600	161,000	55,737,900
1908—Federally inspected	7,279,260	1,958,273	10,304,606	42,981	38,643,101
Total	12,845,000	5,829,900	13,368,800	121,900	65,496,800
1909 (census)—Federally inspected	7,713,807	2,189,017	11,350,349	100,659	31,394,896
Total	13,611,422	6,515,976	14,724,699	285,553	53,219,568
1910—Federally inspected	7,807,600	2,238,587	11,408,020	100,379	26,003,463
Total	13,540,600	6,552,600	14,800,200	284,800	44,073,500
1911—Federally inspected	7,619,006	2,183,533	14,020,446	38,891	34,232,953
Total	12,958,100	6,264,500	18,189,500	110,300	58,022,000
1912—Federally inspected	7,252,378	2,277,946	14,979,265	72,894	33,032,727
Total	11,979,000	6,348,000	19,433,400	206,800	56,022,000
1913—Federally inspected	6,978,361	1,902,414	14,405,759	75,655	34,198,585
Total	11,477,600	5,284,300	18,689,400	214,600	57,975,300
1914—Federally inspected	6,756,737	1,606,962	14,229,343	175,906	32,531,840
Total	11,004,500	4,661,400	18,460,500	499,000	55,148,100
1915—Federally inspected	7,153,395	1,818,702	12,211,765	153,346	38,381,228
Total	10,822,100	4,639,500	15,843,000	435,000	65,064,000
1916—Federally inspected	8,310,458	2,307,303	11,941,366	198,909	43,083,708
Total	12,026,700	5,773,900	15,492,200	564,300	73,035,600
1917—Federally inspected	10,350,052	3,142,721	9,344,994	165,660	33,909,704
Total	13,723,900	7,030,700	12,123,800	470,000	57,488,800
1918—Federally inspected	11,828,549	3,456,393	10,319,877	137,725	41,214,250
Total	15,750,400	7,767,193	13,230,577	390,125	65,732,450
1919—Federally inspected	10,089,984	3,969,019	12,691,117	87,380	41,811,830
Total	13,635,100	9,041,019	16,234,817	247,480	66,680,330
1920—Federally inspected	8,608,691	4,058,370	10,982,180	42,477	38,018,684
Total	12,847,691	9,223,370	14,079,680	120,477	60,449,400
1921—Federally inspected	7,608,280	3,807,568	13,004,905	12,133	38,982,336
Total	12,271,280	8,654,568	16,673,005	34,433	62,172,856

[1] *Data furnished by* the U. S. Department of Agriculture.

w horses are slaughtered under the Federal inspection, and ly more otherwise, the flesh being mostly used to feed wild s in zoological gardens, menageries. etc. The Federal in- n of horses commenced in September, 1919, and 433 were tered up to the end of the year. During 1920 and 1921 the r slaughtered was 894 and 2,562, respectively. A large tion of the inspected horseflesh is exported.

23.—*Domestic production of meats: Estimated total, and Federally inspected.*[1]

[000 omitted.]

lendar year.	Beef.		Veal.		Mutton and lamb.	
	Total.	Federally inspected.	Total.	Federally inspected.	Total.	Federally inspected.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
	7,320	4,336	626	210	559	431
	6,676	3,955	605	203	555	428
	7,071	4,189	684	230	604	466
	7,323	4,240	687	235	600	463
	7,036	4,137	657	229	738	569
	6,509	3,938	668	239	788	608
	5,913	3,595	488	176	738	569
	5,639	3,601	433	158	720	555
	5,816	3,979	428	168	626	482
	6,118	4,362	536	220	612	472
	6,686	5,169	662	296	473	364
	7,320	5,638	791	352	489	381
	6,283	4,774	860	378	602	470
	6,463	4,578	936	402	538	423
	6,194	4,113	864	367	626	494

lendar year.	Pork.[2]		All meats, excluding lard.[3]		Lard.	
	Total.	Federally inspected.	Total.	Federally inspected.	Total.	Federally inspected.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
	7,491	4,420	16,003	9,399	1,693	993
	8,226	4,853	16,067	9,441	1,834	1,094
	6,690	3,946	15,060	8,835	1,506	888
	5,881	3,470	14,502	8,412	1,344	793
	7,511	4,481	15,946	9,368	1,717	1,013
	7,189	4,242	15,162	9,030	1,643	969
	7,492	4,420	14,640	8,763	1,713	1,011
	7,228	4,264	14,039	8,585	1,652	975
	8,050	4,749	14,937	9,384	1,840	1,086
	8,634	5,196	15,922	10,248	1,973	1,164
	6,901	4,071	14,740	9,906	1,577	930
	8,854	5,551	17,469	11,927	2,015	1,263
	8,933	5,584	16,687	11,209	2,089	1,327
	8,193	5,133	16,135	10,538	2,022	1,326
	8,475	5,351	16,160	10,325	2,095	1,384

on data supplied by the U. S. Department of Agriculture. Columns marked "Total" include i both Federally inspected and other.

xcluding lard. Both pork and lard production fluctuate widely, owing largely to the corn crop year and in part to the general economic situation. The fecundity and quick maturity of the is an extremely rapid recovery from lean years, as in 1909, 1910, and 1917. In 1917 the production ed primarily by overmarketing during the year just preceding, when pork prices increased at dented rate.

s a small amount of goat meat.

RATES OF DUTY.

TABLE 24.—*Cattle.*

Act of—	Par.	Tariff classification or description.	Rate of duty
1883.....	Schedule G.	Animals, live.....	20 per cent ad valor
1890.....	248	Cattle, more than 1 year old.....	$10 per head.
		1 year old or less.....	$2 per head.
1894.....	189	All live animals, not specially provided for in this act.	20 per cent ad valor
1897.....	218	Cattle, if less than 1 year old.....	$2 per head.
		All other cattle, if valued at not more than $14 per head.	$3.75 per head.
		If valued at more than $14 per head.....	27½ per cent ad val
1909.....	225	Cattle, if less than 1 year old.....	$2 per head.
		All other cattle, if valued at not more than $14 per head.	$3.75 per head.
		If valued at more than $14 per head.....	27½ per cent ad val
1913.....	619	Swine, cattle, sheep, and all other domestic live animals suitable for human food not otherwise provided for in this section.	Free.
1921.....	12	Cattle.....	30 per cent ad valo

TABLE 25.—*Beef and veal.*

Act of—	Par.	Tariff classification or description.	Rate of duty
1883.....	253	Beef.....	1 cent per pound.
1890.....	311	.....do.....	2 cents per pound.
1894.....	224½	Fresh beef.....	20 per cent ad valo
1897.....	274	Fresh beef, veal.....	2 cents per pound.
1909.....	285	.....do.....	1½ cents per pound.
1913.....	545	.....do.....	Free.
		Provided, however, That none of the foregoing meats shall be admitted into the United States unless the same is healthful, wholesome, and fit for human food, and contains no dye, chemical, preservative, or ingredient which renders the same unhealthful, unwholesome or unfit for human food, and unless the same also complies with the rules and regulations made by the Secretary of Agriculture, and that after entry into the United States and compliance with said rules and regulations, said imported meats shall be deemed and treated as domestic meats within the meaning of and shall be subject to the provisions of the act of June 30, 1906 (34 Stat. L., p. 674), commonly called the meat-inspection amendment, and the act of June 30, 1906 (34 Stat. L., p. 768), commonly called the food and drugs act, and that the Secretary of Agriculture be, and hereby is, authorized to make rules and regulations to carry out the purposes of this paragraph, and that in such rules and regulations the Secretary of Agriculture may prescribe the terms and conditions for the destruction for food purposes of all such meats offered for entry and refused admission into the United States unless the same be exported by the consignee within the time fixed therefor in such rules and regulations.	
1921.....	14	Fresh or frozen beef, veal.....	2 cents per pound.
		Meats of all kinds, prepared or preserved, n. s. p. f.	25 per cent ad valo

6308—22—9

TABLE 26.—*Exports of beef from Argentina to principal markets, 1914–1919.*

[000 omitted.]

Exported to—	1914					1915					1916				
	Frozen and chilled beef.	Jerked beef.	Canned meat.[1]	Meat extract.[1]	Total.	Frozen and chilled beef.	Jerked beef.	Canned meat.[1]	Meat extract.[1]	Total.	Frozen and chilled beef.	Jerked beef.	Canned meat.[1]	Meat extract.[1]	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Belgium	419	.....	5	.....	424	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
France	93	1	.....	.....	94	45,626	.....	5,254	.....	50,880	84,368	3	16,541	.....	100,912
Germany	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Italy	.....	.....	.....	1	1	4,228	.....	.....	.....	4,228	35,545	.....	42	.....	35,587
Netherlands	2,500	.....	.....	.....	2,500	522	.....	.....	2	524	.....	.....	.....	.....	.....
Norway	.....	.....	.....	.....	.....	.....	.....	.....	56	56	.....	1,040	.....	6	1,046
Sweden	.....	.....	.....	.....	.....	.....	.....	.....	3	3	.....	.....	.....	.....	.....
Spain	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United Kingdom	679,570	.....	21,318	817	701,705	659,449	.....	62,201	741	722,391	790,124	56	74,937	1,433	866,550
United States	130,779	2	2,025	.....	132,806	88,325	.....	540	.....	88,865	19,489	16	864	.....	20,369
Cuba	.....	528	.....	.....	528	.....	.....	.....	.....	.....	.....	367	.....	.....	367
Brazil	.....	3,015	.....	.....	3,015	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Uruguay	.....	1,688	9	133	1,830	829	.....	.....	.....	829	2,055	.....	.....	.....	2,055
Other countries[2]	66	6	5,496	.....	5,568	714	470	2,429	16	3,629	11,327	985	5,873	.....	18,185
Total	813,427	5,240	28,853	951	848,471	799,693	470	70,424	818	871,405	942,908	2,467	98,257	1,439	1,045,071

[1] Mostly beef.

[2] Include shipments "for orders."

NOV 5 1923

UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 31

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1922

WASHINGTON
GOVERNMENT PRINTING OFFICE
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1923

UNITED STATES TARIFF COMMISSION.

Office: Eighth and E Streets NW., Washington, D. C.

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INTRODUCTION.

This report is a survey of the domestic dye and synthetic organic hemical industry in 1922. It presents the results of a special investigation made by the United States Tariff Commission as to the roduction in the United States of coal-tar dyes and also of synhetic organic chemicals, both of coal-tar and of noncoal-tar origin. here is included a detailed census of dye imports and official pre- nd post-war statistics for the imports and exports of coal-tar dyes y the large consuming and producing nations of the world.

The survey is divided into six parts as follows:

Part I.—A summary of the census of dyes and other synthetic rganic chemicals, 1922, describes the progress made in the various ranches of the American industry, and analyzes the export and mport trade.

Part II.—A census of dyes and coal-tar chemicals, 1922 discusses ignificant phases of the domestic industry, compares the imports of yes in 1914, 1920, 1921, and 1922 with the production from 1917 o 1922, inclusive, and gives detailed data as to number of employees, ates of pay, and cost of research in the domestic coal-tar chemical ndustry.

Part III.—Contains a census of dyes imported for consumption nto the United States in 1922.

Part IV.—A census of synthetic organic chemicals other than those erived from coal tar presents a comparison of production in 1922 ith that of 1921, the first year for which such data were compiled. here are listed those manufacturers whose production in 1922 was eported to the Tariff Commission.

Part V.—Contains a brief discussion of the international dye trade, ith special reference to the industries of Great Britain, France, nd Switzerland. Official statistics are given for the pre-war year 913, and the post-war years 1920 and 1921, and where available, 922, for the exports and imports of dyes by the important consumng and producing nations of the world.

Part VI.—An appendix gives domestic imports and exports of oal-tar dyes and chemicals during 1922.

In the preparation of this report the Tariff Commission had the ervices of Warren N. Watson, Frank Talbot, and C. R. De Long, f the chemical division of the commission's staff, and of others.

PART I.

SUMMARY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1922.

PART I.

RY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1922.

INTRODUCTORY.

nited States Tariff Commission has reported annually, begin- h 1917, the progress of the American dye industry. Since duction figures on dyes and other coal-tar chemicals have plemented by a detailed census of dye imports. There is in , in the report of 1921 and in the present report, a census of organic chemicals other than those derived from coal tar. ature of the 1922 report is the discussion of the international e, particularly the status of the industry in Great Britain, nd, and France. Official statistics are given as to the and imports of the more important dye consuming and pro- ountries of the world in post-war as compared with pre-war There is also presented a detailed statement of the monthly on of dyes in Germany from February, 1920, to March, 1923, mmary of the stocks of each class reserved for the purchase lied and associated governments.

reports prepared by the Tariff Commission relating to condi- the dye industry include (1) Costs of Production in the Dye , 1918 and 1919, and (2) Dyes and Other Coal-tar Chemicals, r 12, 1918.

neral grouping of coal-tar chemicals adopted in the present llows that of the tariff act of 1922, which conforms in gen- hough not in every detail—with common practice. Crudes, h 1549, free, are contained in and separated from crude intermediates, dutiable under paragraph 27 at 55 per cent nts per pound, are produced from the crudes by chemical and with some exceptions are used only for the manufacture r other finished products by further chemical treatment; and l other finished products are dutiable under paragraph 28 r cent and 7 cents per pound. The term "other finished " includes color lakes, photographic chemicals, medicinals, perfume materials, synthetic resins, and synthetic tanning s. Explosives, derived from coal-tar materials, although under paragraph 28, are not included in this census. A of the production of coal-tar products in 1922, according s given above, is contained in Table 1. Figures of the pro- of dyes and coal-tar chemicals in the United States are from the returns of 209 companies. It is believed that these a complete record of the manufacture of such products in r. In presenting the figures the quantity and value of each are given in as great detail as is possible without revealing ations of individual manufacturers.

SUMMARY OF DOMESTIC PRODUCTION.

CRUDES.

oduction of coal-tar crudes is dependent upon the output of ct coke. In 1922 there were produced in the United States 0 short tons of by-product coke, an increase of more than

3,000,000 tons. This increase occurred despite a scarcity of coal following a strike. As a result of the increased production of by-product coke in 1922, the output of tar was the greatest in the history of the American industry and supplied crude materials for the coal-tar chemical industry far in excess of domestic demands. Of the total tar produced, about one-half was consumed as fuel; only a part of the remainder was distilled into refined products owing to the demand for partly refined products such as motor fuel, solvents, and soft pitches.

The domestic production of crudes is collected by two agencies, according to the producer. The Geological Survey gathers information as to that produced by the distillation of tar at by-product coke ovens and the United States Tariff Commission collects data as to the output of firms primarily engaged in tar distillation. Figures from the two sources appear in Tables 2 and 3.

The production of crude anthracene in 1922 was a slight gain over that reported in 1921. Several years ago one of the unsolved problems of the domestic dye industry was how to secure an adequate supply of anthracene for use in the manufacture of anthraquinone which, in turn, is required in the manufacture of vat and alizarin dyes. Several firms now produce anthraquinone by a synthetic process from phthalic anhydride and benzene; the output by the synthetic process supplements the supply derived from anthracene, and it can be stated that as fast as the requirements of the dye makers increase there will be an adequate supply of anthraquinone from the two sources.

INTERMEDIATES.

Increased production.—The total production of intermediates in 1922 by 106 firms was 165,048,155 pounds, an increase of 133 per cent over the output in 1921. The total sales in the same year were 58,004,435 pounds, valued at $12,910,486. The average sales price for intermediates was 22 cents per pound, a 12 per cent decrease from that of 1921. This decrease was a general one both for bulk intermediates and for products used in smaller quantities. The price of aniline decreased from 22 cents per pound in 1921 to 15 cents in 1922; H acid, from 95 cents to 73 cents; b-naphthol, from 39 to 24 cents; anthraquinone, from $1.59 to $1.34 per pound.

Increase in number of intermediates.—The total number of intermediates in 1922 was 280. Of this number 85 were not reported in 1921. Many of these are new and are required in the manufacture of the more complex and faster types of dyes. Their addition to the domestic manufacturing program is an important advancement in the industry. The coal-tar intermediates are used not only in the manufacture of dyes but in the production of medicinals, flavors, perfume materials, photographic chemicals, synthetic phenolic resins, synthetic tanning materials, accelerators for vulcanizing, and explosives. The industry is still deficient in certain products, while in others production is not yet adequate for all domestic needs.

DYES.

Production increases 66 per cent.—The domestic production of dyes in 1922 by 87 firms was 64,632,187 pounds, an increase of 66 per cent over that of the previous year. Sales totaled

69,107,105 pounds, valued at $41,463,790. The pre-war production in 1914 by 7 firms was 6,619,729 pounds, valued at $2,470,096. The general increase in dye production during 1922 was largely due to the business revival. Beginning about June, the textile and other dye-consuming industries became more active after a long business depression, and during the remaining months of the year the demand for dyes steadily increased. All classes of dyes shared in this increase.

Large price reduction.—The average price of all dyes produced in 1922 was 28 per cent below that for the previous year. The price averaged 60 cents per pound, compared with 83 cents in 1921 and $1.26 per pound in 1917.

The large reduction in the price of dyes was a general one both for bulk colors and for dyes consumed in smaller quantities. The average price of indigo in 1922 was 24 cents per pound, compared with 45 cents in 1921, a 47 per cent decrease. Direct deep black EW declined in price 47 per cent; Acid black, 28 per cent; Salicine black U, 27 per cent. Among dyes which do not constitute bulk colors there were reductions in price as follows: 30 per cent in Indanthrene blue GCD; 20 per cent in Alizarin; 34 per cent in Alizarin saphirol B; 41 per cent in Wool green S; and 24 per cent in Eosine.

Vat and alizarin dyes increased over 200 per cent.—The large increase in the production of anthraquinone dyes was one of the conspicuous developments of the year. These dyes are fast to laundry treatment, and are used for dyeing and printing cotton. The alizarin derivatives are of great value in wool dyeing. Their manufacture in the United States is essential to a well-rounded and self-contained dye industry.

The use of vat dyes is on the increase with the dissemination of information as to the availability of fast shades for cotton. Higher prices for cotton goods have also favored the use of the best available dyes, even at a slight increase in cost. The total production of anthraquinone dyes in 1922 was 1,234,963 pounds; the production of vat dyes other than indigo was 1,075,992 pounds, compared with 345,152 pounds in 1921.

Many new dyes produced.—The addition to the domestic manufacturing program of many important dyes for silk, cotton, and wool was one of the developments of 1922. These include vat dyes, alizarins for wool, developed cotton dyes, and mordant and acid colors. Increased production of these dyes is reflected in the reduced importation. Most of the new dyes are colors of great complexity and their manufacture is the result of painstaking investigation. The developments in the past year are highly creditable, but the domestic industry is still deficient in vat dyes and certain of the mordant, acid, and direct colors.

Quality and standardization of American dyes.—The satisfactory quality of American dyes is one of the evidences of the progress made by the domestic industry. Dye for dye, with relatively few exceptions, the domestic product is the equal of the pre-war German product. In the early stages of the American dye industry, after the outbreak of the war, there was a lack of uniformity as to strength and quality, but this condition no longer prevails. Domestic manufacturers now market uniformly standardized products of good quality. Statements of the largest silk and woolen manufacturers, and of cotton printers and dyers, agree as to the satisfactory results obtained from American colors.

Relation of production to consumption.—The imports of dyes in 1922 were 6.2 per cent of total production by quantity and 6.5 per cent of the apparent consumption which is assumed to equal production plus imports minus exports. The production by quantity is 104.8 per cent of the total consumption. The United States produced about 93.5 per cent of the dyes apparently consumed.

Production by classes.—The production of dyes in 1922 grouped by classes according to method of application was as follows: Acid dyes, 9,880,014 pounds, or 15.29 per cent; basic dyes, 2,937,585 pounds, or 4.54 per cent; direct dyes, 11,931,737 pounds, or 18.46 per cent; lake and spirit-soluble dyes, 1,009,512 pounds, or 1.56 per cent; mordant and chrome dyes, 3,749,701 pounds, or 5.8 per cent; sulphur dyes, 16,913,767 pounds, or 26.17 per cent; vats, including indigo, 16,926,744 pounds, or 26.19 per cent; indigo, 15,850,752 pounds, or 24.52 per cent; and other vat dyes, 1,075,992, or 1.67 per cent. Unclassified dyes amounted to 1,283,127 pounds, or 1.99 per cent of total production.

Imports.—Total imports of coal-tar dyes in 1922 were 3,982,631 pounds, valued at $5,243,257, compared with 4,252,911 pounds in 1921 and 45,950,895 pounds in 1914. Of the total imports during 1922, 44.58 per cent came from Germany, 43.72 per cent from Switzerland, 5.25 per cent from England, 4.18 per cent from Italy, and 2.27 per cent from other countries. In 1921 Germany supplied 48.34 per cent and in 1920, 51 per cent. Imports in 1922 classified by method of application were as follows: Acid dyes, 601,395 pounds; indigo, 505 pounds; vat dyes, other than indigo, 1,548,519 pounds; alizarins, 27,086 pounds; mordant and chrome dyes, 689,704 pounds; direct cotton dyes, 671,621 pounds; sulphur dyes, 194,883 pounds; basic dyes, 155,084 pounds; spirit-soluble and color lake dyes, 76,853 pounds; and unclassified dyes, 16,981 pounds.

Table 15 shows the quantity and value of each dye imported in 1922. Table 14 shows the leading dyes of each class according to application imported in that year.

Research.—The coal-tar chemical industry has expended over $21,000,000 in research alone during the last five years (1917–1922). In probably no other field have there been so extensive investigations as in the manufacture of dyes. The progress and developments of that period may be attributed in no small part to the enormous expenditures in research. New dyes and other chemicals have been developed and costs of production have been reduced. The decrease in expenditure for research in 1921 and 1922 may be attributed in part to the business depression. While the progress of the industry was retarded somewhat by reduced allowances for experimental work, advances were nevertheless made during that period.

1922 exports show large decline.—The combined value of the exports of "color lakes" and "other colors, dyes, and stains" in 1922 was $3,023,127, and the quantity amounted to 6,956,593 pounds. This value represents a 52 per cent decline from that of 1921, when the combined value of exports of "aniline dyes" and "all other dyes" was $6,270,155. The 1922 figure is a 90 per cent decline from that of 1920, when the dye export trade reached a maximum of $29,823,591.

The large export of 1920 was during the boom year of business activity before the German dyes had again appeared in the international dye markets. The official imports of China, India, and Japan show that German dyes were exported in large quantities to those countries after 1920, and that Switzerland, France, and Great Britain were also factors in 1921 in the Far East markets.

The large exports in 1919 and 1920 are not a measure of the competitive strength of the American industry because during those years Germany was not active in foreign markets. Since the outbreak of the war Great Britain, the United States, and France have developed large dye industries, and Switzerland has also expanded her industry, with the result that competition in the world's markets has been greatly increased.

1923 dye exports increase.—The total exports of "coal-tar colors, dyes, and stains," as reported by the monthly summary of foreign commerce for the first four months of 1923, were 5,456,812 pounds, valued at $1,787,063. This increased demand for American dyes, largely by the Far East market, may be attributed in part to the reduced exports of German dyes since the occupation of the Ruhr by the French in 1923.

INTERNATIONAL DYE TRADE.

Prior to the war Germany, with an output totaling three-fourths of all synthetic dyes produced, dominated the world's dye markets; of the remaining fourth, one-half were made from German intermediates, and consequently the production was dependent upon Germany. On this basis about 88 per cent of the world's dye trade was controlled by Germany. Switzerland, although without raw materials, ranked second, with about 7 per cent of the world's production. Practically all raw materials used by the Swiss dyemakers were of German origin. Great Britain prior to the war produced about one-tenth of her requirements, and France produced in French-owned and operated plants about 10 to 15 per cent of her consumption. In both France and Great Britain dye plants were operated and owned by German dyemakers; in France or England, as the case might be, in the manufacture of dyes from intermediates of German production, the final assembling operations were completed in order to meet the patent requirements of those countries. In the United States prior to the war the small industry that existed depended almost entirely on intermediates from Germany.

Soon after the beginning of the World War the supply of German dyes was shut off from dye-consuming nations. The stocks on hand were soon exhausted and there developed a dye famine which threatened the activities of the vast textile industries as well as others dependent upon dyes for operation. The prices of dyes rapidly increased and certain colors were not to be had at any price.

As a result of War conditions the manufacture of dyes in the United States, Great Britain, and France was greatly stimulated and great progress was made toward the development of a self-sufficient industry. Each of these countries has exported significant quantities of dyes since the signing of the armistice and each now produces more than eighty per cent of its own requirements. The German monopoly of the world's dye production has been temporarily if not permanently

broken. The large developments during the war have probably resulted in the doubling of the world's capacity to manufacture dyes.

The German industry offers a united front to the world under the powerful combination known as the I. G.—Interessen Gemeinschaft—and has the advantage of cumulative experience, lower manufacturing costs, and a unified organization for buying and selling. The three Swiss firms have also formed an amalgamation. Severe competition may be expected in the world's dye market as a result of the large developments during and since the war. The first contact in this competitive rivalry occurred in the Far East markets in 1921 when Germany recaptured a large part of her lost trade. In consequence the exports of the United States in that year showed a sharp decline from the large foreign sales of 1920.

China leads all nations as a consumer of dyes. Present estimated consumption exceeds 70,000,000 pounds per year. The United States ranks second, with an average annual consumption of about 55,000,000 pounds. Great Britain follows with a consumption of approximately 50,000,000 pounds per year. It is anticipated that Germany will make every endeavor to recover a part of her large dye trade in these markets during the coming years. In case tariff or other measures designed to stimulate domestic production are continued by those countries, the German industry may establish factories or seek industrial affiliations, as has been done by Swiss manufacturers who have established plants in both the United States and Great Britain.

The export prices of German dyes are far above pre-war levels and a reduction is possible in case sharp competition develops.

As a result of experiences during the war and of the Ruhr occupation, it is considered probable that the large industrial nations will endeavor to retain their dye industries to meet their essential requirements in time of peace and to provide for the emergencies of national defense. The future of these newly established dye industries will depend upon many factors, among which are reduced costs of manufacture, development of new products, governmental measures adopted to stimulate production, and ability to retain a portion of the world's export trade for certain bulk products as a source of income and as a means of balancing production.

OTHER FINISHED COAL-TAR PRODUCTS.

Color lakes.—The total output of this class of pigments in 1922 by 43 firms was 10,578,664 pounds, compared with 6,152,187 pounds in 1921. The total sales of color lakes amounted to 10,366,676 pounds, valued at $4,551,572.

Photographic chemicals.—The production by 7 firms of those coal-tar chemicals used as photographic developers totaled, in 1922, 345,798 pounds, compared with 183,798 pounds in 1921. Sales amounted to 347,647 pounds, valued at $483,269.

Medicinals.—This class of coal-tar products may be considered as essential to national welfare. The highest technical and research skill is required in the development and commercial production of these chemicals. During 1922 conspicuous progress was made in the development of synthetic medicinals of coal-tar origin. The total production as reported by 35 firms was 2,946,347 pounds, and the sales amounted to 3,092,915 pounds, valued at $4,233,443. The 1921

production totaled 1,545,917 pounds and the sales amounted to 1,876,246 pounds, valued at $2,930,324.

Perfumes and flavors.—These coal-tar products are closely related, certain members of the class being used both as flavors and perfumes. The total output of flavors in 1922 by 20 firms was 1,215,668 pounds, compared with 901,245 pounds in 1921. Sales amounted to 1,278,857 pounds, valued at $1,260,588. The production of perfumes by 17 firms in 1922 was 793,148 pounds, compared with 119,335 pounds for the previous year. Sales amounted to 778,696 pounds, valued at $643,436.

Synthetic phenolic resins.—These products are used as substitutes for amber in making pipe stems and a great variety of other articles, and for electrical insulators, varnishes, and lacquers. The 1922 production by 5 concerns was 5,944,133 pounds, compared with an output of 1,643,796 pounds during the previous year. Sales in 1922 amounted to 6,415,931 pounds, valued at $4,315,196.

Synthetic tanning materials.—The output of these products by 4 firms amounted to 1,910,519 pounds in 1922, compared with 1,902,597 pounds in 1921. The sales were 1,981,588 pounds, valued at $103,598.

Research chemicals.—The production of research chemicals by 4 manufacturers amounted to 1,667 pounds in 1922. The total sales were 650 pounds, valued at $12,434.

TABLE 1.—*Summary of the production of dyes and coal-tar chemicals, 1918–1922.*

	1918			1919		
	Number of manufacturers.	Production.		Number of manufacturers.	Production.	
		Pounds.	Value.		Pounds.	Value.
Group II—Intermediates	128	357,662,251	$124,382,892	116	177,362,426	$63,210,079
Group III—Finished products	.....	70,802,959	83,815,746	155	82,532,390	84,585,544
Dyes	78	58,464,446	62,026,390	90	63,402,194	67,598,855
Color lakes	29	9,590,537	5,020,023	34	7,569,921	4,179,964
Photographic chemicals	6	316,749	823,915	10	335,509	1,059,340
Medicinals	31	3,623,352	7,792,984	31	6,777,988	7,883,071
Flavors	7	458,256	4,925,627	9	610,825	1,318,654
Perfumes	6	116,263	584,695	6	41,419	164,302
Tanning materials	1	4,233,356	2,642,120	1	3,794,534	2,381,358
Synthetic phenolic resins	5			5		

	1920			1921			
	Number of manufacturers.	Production.		Number of manufacturers.	Production.	Sales.	
		Pounds.	Value.		Pounds.	Pounds.	Value.
Group II—Intermediates	119	257,726,911	$95,291,686	108	70,899,912	33,637,326	$8,483,463
Group III—Finished products	161	112,942,227	112,731,547	147	51,457,565	60,434,009	47,996,514
Dyes	82	88,263,776	95,613,749	74	39,008,690	47,513,762	39,283,956
Color lakes	43	10,983,538	5,871,820	43	6,152,187	6,424,612	2,863,189
Photographic chemicals	8	440,759	1,015,848	5	183,798	170,221	248,041
Medicinals	35	5,184,989	5,726,776	34	1,545,917	1,876,246	2,930,324
Flavors	15	166,884	527,493	17	901,245	933,662	1,002,018
Perfumes	12	99,740	332,008	15	119,335	119,691	175,815
Tanning materials	4	3,142,861	233,674	4	1,902,597	1,721,359	141,005
Synthetic phenolic resins	4	4,659,680	3,410,179	3	1,643,796	1,674,456	1,352,166

TABLE 1.—*Summary of the production of dyes and coal-tar chemicals, 1918–1922*—Con.

	1922			
	Number of manufacturers.	Production.	Sales.	
		Pounds.	Pounds.	Value.
Group II—Intermediates	106	165,048,155	58,004,435	$12,910,486
Group III—Finished products	164	88,368,131	93,370,065	57,067,326
Dyes	87	64,632,187	69,107,105	41,463,790
Color lakes	43	10,578,664	10,366,676	4,551,572
Photographic chemicals	7	345,798	347,647	483,269
Medicinals	35	2,946,347	3,092,915	4,253,443
Flavors	20	1,215,668	1,278,857	1,260,588
Perfumes	17	793,148	778,696	643,436
Tanning materials	4	1,910,519	1,981,588	103,396
Synthetic phenolic resins	5	5,944,133	6,415,931	4,315,196
Research chemicals	4	1,667	650	12,434

SYNTHETIC ORGANIC CHEMICALS OTHER THAN THOSE DERIVED FROM COAL TAR.

The Tariff Commission for the first time in 1921 compiled a census of organic chemicals other than those derived from coal tar or directly from natural sources. These included acids, alcohols, esters, ketones, aldehydes, derivatives of alkaloids, carbocyclic compounds, etc., and are used as perfume and flavoring ingredients, solvents, medicinals, and also in industrial and other processes.

Organic chemicals of noncoal-tar origin have been rather neglected during the past 30 years, owing to the great interest and remarkable progress made in the coal-tar organic chemicals. The rapid development of the past few years in the noncoal-tar organic chemicals indicates that there will be further expansion in this field and that new products of great economic value will continue to be placed on the market.

The production of synthetic organic chemicals other than those derived from coal-tar in 1922 was 79,202,155 pounds, and sales for that year amounted to 60,494,494 pounds, valued at $11,964,074. The production in 1921 totaled 21,545,186 pounds. There were included in 1922, however, a number of products which were not reported in 1921, so the totals for the two years are not strictly comparable.

A detailed census of this group of organic chemicals is contained in Part V, showing production and sales in cases in so far as the publication of such figures can be given without disclosing the output of the individual manufacturer.

PART II.

PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1922.

PART II.

PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1922.

COAL-TAR CRUDES.

By-product coke exceeds 28,000,000 tons.—The preliminary figures for the domestic production of coke in 1922, as reported by the United States Geological Survey, show a total of 36,586,000 tons. The output of by-product coke alone was 28,553,000 tons, while that of beehive ovens totaled 8,033,000 tons. The total domestic production of coke in 1921 was 25,288,000 tons and for 1920, 51,345,000 tons. During 1922 and 1921, 78 per cent of the coke produced was from by-product ovens, as compared with 60 per cent in 1920 and 22 per cent from beehive ovens.

The increased production of by-product coke is reflected in the record output in 1922 of the by-products, tar, ammonia, and gas. As stated in the census of 1921, the replacement of beehive ovens by the by-product variety, which recover the tar, ammonia, and gas products entirely wasted by the old beehive type, is of great economic significance in the conservation of national resources for the following reasons: (1) The by-product ovens increase production of ammonia for fertilizer and other use; (2) the gas produced in these ovens is used for municipal lighting and industrial heating; and (3) the output of tar insures an abundant supply of coal tar for the preparation of crudes which serve as a basis of the domestic coal-tar dye and chemical industry.

Output of coal-tar crudes.—The output of tar in 1922 approximated 328,000,000 gallons compared with 253,000,000 gallons in 1921. An estimate for light oil similarly shows the large increase to 102,000,000 gallons compared with 76,000,000 gallons for 1921, while ammonia (sulphate equivalent of all forms) totaled 896,000,000 pounds.

The domestic production of crudes is collected either by the Tariff Commission or by the Geological Survey, according to the producer. Crudes distilled from tar at by-product coke-oven plants are reported to the Geological Survey. The production from this source for the years 1920–1922 is shown in Table 2. The production of crudes by firms engaged primarily in the distillation of coal tar is reported to the Tariff Commission and is shown in Table 3. The figures from both sources must be considered in arriving at the total output for a given year. Of the total production of light oil at by-product coke ovens, the greater part is refined at the coke-oven plants. The bulk of the refined product is marketed in the form of motor fuel, which is partly refined benzene containing toluene and a small amount of solvent naphtha. Details for the production of refined benzene, toluene, and naphthalene at coke ovens are contained in Table 3. In comparing the production of crudes at the by-product coke ovens with the production by tar refiners, it will be noted that a very large part of the total output of refined naphthalene was made by tar refiners.

Production of crudes by tar refiners.—The total domestic output of tar at coke ovens is far in excess of the needs of the domestic dye and coal-tar chemical industry. The detailed tables of the by-product ovens show that only a part of the tar is refined; in fact, approximately 50 per cent of the tar is consumed as boiler fuel in metallurgical plants. The tar distillers must accordingly pay somewhat more than the fuel value of the tar. Of the total tar sold by the by-product oven operators only a part is distilled into refined benzene, toluene, naphthalene, and anthracene, as there is a considerable demand for partly refined products, such as motor fuel, solvents, and soft pitches. Table 3 shows production of crudes reported to the Tariff Commission by firms not primarily engaged in the operation of coke-oven plants and gas houses. There was, in general, an increased production of practically every crude during 1922 over the previous year. Benzene showed a large gain, totaling 5,708,421 gallons compared with 2,171,631 gallons in 1921. The output of toluene for 1922 was nearly five times that of 1921; xylene likewise showed a large increase. The production of naphthalene was 19,323,393 pounds compared with 16,949,464 pounds in the previous year. In 1922 the production of crude anthracene (less than 30 per cent) was 1,738,444 pounds, which represents a slight increase over that for 1921. Production of carbazole (crude, 60 per cent) showed a large gain, while the output of pyridine declined. Crude cresol showed a large increase in production, and the figures for solvent naphtha, creosote oil, and anthracene oil also recorded gains in 1922.

Imports of crudes during 1922.—Details of the domestic imports for consumption are given in Part VI of this publication. The more important items include "benzol," with a total of 172,528 pounds, a large decline from 1921, when the figure was 1,722,085 pounds. Total imports of cresol were 3,756,651 pounds, a large increase over the previous year, while imports of creosote oil totaled 41,566,767 pounds compared with 33,239,432 pounds in 1921. Imports of crude naphthalene were 3,144,332 pounds.

TABLE 2.—*By-products obtained from coke-oven operations, 1920–1922.*

[From Mineral Resources of the United States, 1921, published by the Geological Survey.]

Product.	Production.	Sales.		
		Quantity.	Value.	
			Total.	Average.
1920.				
Tar.....gallons..	360,664,124	174,363,696	$6,378,040	$0.037
Ammonia:				
Sulphate.....pounds..	675,816,486	626,013,975	27,110,260	.043
Ammonia liquor (NH_3 content).....do....	65,777,239	62,076,772	8,585,173	.138
Other forms (NH_3 content).....do....				
Sulphate equivalent of all forms.....do....	(938,925,522)	(874,321,063)	35,695,433	.041
Gas:				
Distributed through city mains...M cubic feet..	[1] 476,485,744	53,220,824	15,716,888	.295
Used in steel or affiliated plants.....do....		151,764,807	14,301,095	.094
Used under boilers, etc.....do....		25,430,288	2,216,335	.087
	[1] 476,485,744	230,415,919	32,234,318	.140

[1] Includes gas wasted and gas used for heating retorts.

2.—*By-products obtained from coke-oven operations, 1920–1922*—Continued.

Product.	Production.	Sales.		
		Quantity.	Value.	
			Total.	Average.
1920.				
nd drivatives:				
light oil.....gallons..	[2] 109,709,915	1,067,045	$126,158	$0.118
l—				
ude.....do....	8,747,572	1,510,420	401,296	.266
efined.....do....	16,977,556	15,720,356	4,096,527	.260
fuel [3].....do....	57,645,462	55,764,265	12,644,931	.227
l:				
ude.....do....	287,142			
efined.....do....	2,710,649	2,470,364	740,722	.300
t naphtha.....do....	5,678,525	4,695,464	851,048	.181
	92,046,906	81,227,914	18,860,682	.232
ne:				
.....pounds..	11,246,807	11,507,703	307,999	.027
d.....do....	2,921,282	2,941,059	179,975	.061
	14,168,089	14,448,762	487,974	.034
lucts [4].....			36,317	
e of all by-products sold.....			93,692,764	
1921.				
.....gallons..	253,051,649	135,293,047	5,645,309	.042
ite.....pounds..	528,638,763	530,041,716	13,100,703	.025
nia liquor (NH_3 content).....do....	31,899,398	35,102,561	3,515,416	.100
forms (NH_3 content).....do....	191,162	53,993	10,135	.188
hate equivalent of all forms.....do....	(657,001,003)	(670,667,932)	16,626,254	
nder boilers, etc.....M cubic feet..	[1] 310,188,713	12,122,777	1,120,087	.092
n steel or affiliated plants.....do....		98,352,049	10,593,204	.108
uted through city mains.....do....		43,826,172	14,249,961	.325
	[1] 310,188,713	154,300,998	25,963,252	.168
nd derivatives:				
light oil.....gallons..	[5] 76,917,269	2,433,078	240,111	.099
—				
ude.....do....	1,494,329	1,536,312	343,463	.224
efined.....do....	4,912,131	5,302,709	1,268,258	.239
benzol.....do....	48,052,882	50,022,573	8,966,686	.179
—				
ude.....do....	26,529	26,529	4,410	.166
efined.....do....	942,982	808,964	228,968	.283
t naphtha.....do....	3,822,776	2,881,656	510,509	.177
miscellaneous products.....do....	590,173	291,635	12,310	.042
	59,841,802	63,303,456	11,574,715	.183
ne:				
.....pounds..	2,827,756	1,652,466	40,659	.025
d.....do....	115,229	331,057	18,676	.056
	2,942,985	1,983,523	59,335	.030
lucts.....			121,813	
e of all by-products sold.....			59,990,678	

s gas wasted and gas used for heating retorts.
quantity, crude light oil refined on the premises amounted to 106,264,417 gallons.
nzol content of motor fuel ranged from 50 to 100 per cent.
s coal-tar oil, crude heavy solvent, carbon, and pyridin oil.
amount 75,760,334 gallons were refined on the premises to make the derived products listed.

TABLE 2.—*By-products obtained from coke-oven operations, 1920–1922*—Continued.

Product.	Production.	Sales.		
		Quantity.	Value.	
			Total.	Average.
1922.[6]				
Tar.....gallons..	327,921,000	149,151,000	$5,967,000	$0.040
Ammonia:				
Sulphate.....pounds..	699,069,000	718,279,000	17,906,000	.025
Ammonia liquor (NH_3 content).....do....	48,590,000	47,121,000	3,417,000	.073
Other forms (NH_3 content).....do....	694,000	193,000	12,000	.062
Sulphate equivalent.....do....	896,205,000	907,535,000	21,334,000	.024
Gas:				
Used under boilers, etc.....M cubic feet..	[4] 442,546,000	.....	.....	.....
Used in steel or affiliated plant.....do....				
Distributed through city mains.....do....				
	442,546,000	230,197,000	37,347,000	.162
Light oil and derivatives:				
Crude light oil.....gallons..	[7] 102,118,000	5,138,000	631,000	.123
Benzol—				
Crude.....do....	1,937,000	1,922,000	504,000	.262
Refined.....do....	9,359,000	8,518,000	2,432,000	.286
Motor benzol.....do....	57,117,000	55,031,000	10,510,000	.191
Toluol—				
Crude.....do....	38,000	4,000	652	.163
Refined.....do....	1,846,000	1,788,000	522,000	.292
Solvent naphtha (crude and refined, including xylol).....gallons..	2,845,000	2,723,000	511,000	.188
Other light oil products.....do....	579,000	212,000	15,000	.071
Total.....	73,721,000	70,198,000	14,494,652	.....
Naphthalene:				
Crude (melting point below 79° C.)....pounds..	6,345,000	3,299,000	52,000	.016
Refined (melting point 79° C. or over)...do....	1,811,000	1,589,000	79,000	.050
Total.....	8,156,000	4,888,000	131,000	.....
Other products.....	.....	.....	155,000	.....
Value of all products sold.....	.....	.....	79,428,652	.....

[4] Includes gas wasted and gas used for heating retorts.
[6] Preliminary figures. Subject to revision.
[7] Of this amount 95,554,000 gallons were refined on premises to make the desired products listed.

LE 3.—*Production of coal-tar crudes, 1922, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

numbers in the second column refer to the numbered alphabetical list of manufacturers given on 117. An X indicates that the corresponding product was made by a manufacturer who did not ent to the publication of his name in connection therewith. Blanks in the third and fourth columns cate that there was actual production of the corresponding article, but that the figures can not be lished without revealing the output of individual firms.]

Name.	Manufacturers' identification numbers (according to list on page 117).	1922		
		Quantity.	Value.	Value per unit.
crudes [1]			$21,261,849	
ne....gallons..	16, 24, 49, 102, X, X	5,708,421	1,531,134	$0.27
ne....do....	16, X, X			
e....do....	16			
thalene, crude....pounds..	8, 13, 15, 16, 32, 49, 94, 102, 111, 131, 155, 165, 179, 206, X.	19,323,393	352,957	.02
racene, less than 30 per cent ....pounds..	8, 155, 165	1,738,444	100,713	.06
zole, crude, 60 per cent ....pounds..	16, 155			
....gallons..	16, 102, 111, 155			
ine....do....	16, 126			
nt naphtha....do....	13, 16, 49, 94, 102, 165, X, X	996,852	281,870	.28
or creosote oil....do....	8, 13, 16, 32, 49, 94, 102, 111, 131, 155, 165, 179, 206, X, X, X.	33,874,418	3,698,319	.11
racene oil....do....	8, 155, 165	3,705,882	674,586	.18
of tar....tons..	8, 13, 16, 24, 32, 49, 94, 111, 131, 155, 165, 179, 206, X, X, X.	371,314	6,607,673	17.80
distillates....gallons..	8, 16, 24, 32, 49, 102, 111, 155, 179, 199, 203, X.	9,710,745	1,498,741	.15
ed tars....barrels..	8, 13, 16, 24, 32, 94, 111, 131, 165, 179, 206, X, X, X, X, X.	1,203,089	5,758,296	4.79
r fuel [2]....gallons..	102, 131, X			

he instructions sent to manufacturers were as follows: Include under dead or creosote oil only products t may be used for creosoting. Include under other distillates shingle stain oils, disinfectant oils, lotation oils which do not contain over 5 per cent of phenol. Include under refined tars those tars t are used for road treatment, saturating felt, and for protective coatings. Phenol and all distillates , on being subjected to distillation, yield in the portion distilling below 190° C. a quantity of tar equal to or more than 5 per cent of the original distillate, or which, on being subjected to distillation, in the portion distilling below 215° C. a quantity of tar acids equal to or more than 75 per cent of the al distillate, are not to be included here but are to be placed under intermediates.
cluded in benzine last year.

LE 4.—*Comparison of production of coal-tar crudes, 1921 and 1922, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

Name.	1922			1921		
	Quantity.	Value.	Value per unit.	Quantity.	Value.	Value per unit.
crudes		$21,261,849			$17,936,160	
ne....gallons..	5,708,421	1,531,134	$0.27	2,171,631	463,205	$0.21
thalene, crude....pounds..	19,323,393	352,957	.02	16,949,464	380,167	.02
racene, 25 per cent pure ....pounds..	1,738,444	100,713	.06	1,604,717	83,707	.05
nt naphtha....gallons..	996,852	281,870	.28	649,694	111,286	.17
or creosote oil....do....	33,874,418	3,698,319	.11	28,864,156	3,188,867	.11
racene oil....do....	3,705,882	674,586	.18	2,857,391	519,347	.18
of tar....tons..	371,314	6,607,673	17.80	347,011	6,514,200	18.77
distillates....gallons..	9,710,745	1,498,741	.15	6,562,332	1,209,291	.18
ed tar....barrels..	1,203,089	5,758,296	4.79	1,029,282	5,196,427	5.05

INTERMEDIATES.

escription.—This class of coal-tar chemicals does not occur as in coal tar, but is prepared from the crudes (benzene, toluene, hthalene, and anthracene) by chemical treatment with sulric acid, nitric acid, alkalies, chlorine, or other chemicals. From

less than 10 coal-tar crudes there are prepared from 200 to 300 intermediates for use in the production of hundreds of dyes. The various chemical steps required in the conversion of crudes to intermediates are (1) nitration; (2) reduction; (3) sulphonation; (4) caustic fusion; (5) chlorination; (6) alkylation; (7) liming; (8) condensation; (9) carboxylation; (10) oxidation; and (11) diazotization.

Intermediates are therefore the raw materials which by complex chemical processes are converted into dyes, medicinals, perfumes, flavors, photographic chemicals, and synthetic resins and tanning materials. They are also used to accelerate the vulcanization of rubber, as camphor substitutes, in the direct production of dyes on the fiber, and for increasing the fastness of dyed colors, in which case they are known as "developers." After purification, many intermediates are used directly as drugs, perfumes, and flavors.

Production.—The production of intermediates in the United States in 1922 is shown in Table 5 in as great detail as is possible without revealing the output of individual manufacturers. The total output in 1922 was 165,048,155 pounds compared with 70,899,912 pounds in 1921. The sales in 1922 totaled 58,004,435 pounds with a value of $12,910,486.

The average sales price for intermediates in 1922 was 22 cents, which is a 12 per cent decrease from that of 1921. This decrease is substantial for bulk intermediates, as well as for products used in small quantities. Aniline decreased in price from 22 cents per pound in 1921 to 15 cents in 1922; H acid, from 95 cents to 73 cents; b-naphthol, from 39 to 24 cents; anthraquinone, used in the preparation of the alizarin and vat dyes, from $1.59 per pound to $1.34 per pound.

The total number of intermediates reported was 280, of which 85 were not reported in 1921. Many of these intermediates are of great complexity and their manufacture presents great technical difficulties. They are used where fast colors or special types of dyes are required, and their addition to the manufacturing program is an important advancement in the industry. One of the conspicuous features of production in 1922 was the significant increase in the output of anthraquinone, J acid, and Chicago acid and other intermediates, used in the manufacture of fast and special types of dyes, such as the vat colors, alizarin, and the direct dyes.

Benzene derivatives.—Aniline prepared from benzene through the intermediate product nitrobenzene is the most important of all finished intermediates. In 1922 it ranked first in value and second in quantity. It is used in the manufacture of dyes of almost every class, whether the classification be based on method of application or on chemical constitution. Among the dyes which require aniline in their production, those produced in significant amounts are Indigo, Direct black E W, and Agalma black 10 B. These constitute three out of four leading colors in quantity produced in this country during 1922. The production of aniline was 21,401,864 pounds, compared with 5,639,234 pounds in 1921, and sales totaled 12,064,465 pounds with a value of $1,827,941. The production of aniline salt (aniline hydrochloride) was 825,558 pounds and of aniline sulphate, 289,913 pounds. Aniline hydrochloride is largely consumed by the cotton dyer in the direct production of "aniline black" on the fiber. Dimethylaniline (prepared from aniline by treatment with methyl alcohol), is used in the manufacture of such important basic dyes as *Methyl violet*, Methylene blue B, and Malachite green. The out-

ut of this intermediate in 1922 was 2,327,561 pounds, compared ith 566,286 pounds in 1921; the price was 32 cents, compared ith 54 cents for the previous year. Diethyaniline, the production of hich was 42,040 pounds, is used in the manufacture of certain more xpensive dyes, such as Brilliant green, Acid violet, and Patent blue. he output of ethylbenzylaniline increased from 16,949 pounds in 921 to 129,340 pounds in 1922. Dichloroaniline showed an increase out-put of over 600 per cent. m-Phenylenediamine doubled output compared to the previous year, with a total of 636,646 ounds. The production of p-nitroaniline, an important inter- iediate used in the preparation of "para red," both on the fiber and r color lakes and also for the manufacture of Diamine green B and , Alizarin yellow R, and certain sulphur dyes, totaled 1,563,665 ounds. Dinitrochlorobenzene, used for the manufacture of sulphur lacks and blues showed an increase to 6,243,116 pounds, compared ith 2,408,472 pounds in the previous year. The output of phenyl- ydrazine p-sulphonic acid represented one of the largest increases f all the intermediates.

During the past few years, one of the significant developments in he coal-tar industry has been the production of substitutes for amphor used in the manufacture of pyroxylin plastics. These ere first reported in 1920 and have since showed large increases output. During 1922 there was a large increase in the output of ricresyl-phosphate compared with the previous year.

Owing to increased activity in the rubber trade, the consump- ion of rubber accelerators showed a large increase. The out- ut of thiocarbanilide for 1922 was 2,594,856 pounds and the sales ere 938,921 pounds, with a value of $258,856. The average price eceded to 27 cents from 42 cents in the previous year. Other rubber ccelerators reported in large amounts were triphenylguanidine, nilidobenzene thiazol and derivatives, and diphenylguanidine.

The production of phenylglycine, used for indigo, recorded large ains over the previous year. Acetanilide (technical), used as an ntermediate, a medicinal (when purified), a stabilizer for hydrogen eroxide, and an ingredient in cellulose ester dopes and lacquers as produced to the amount of 1,418,127 pounds.

Benzidine, prepared by reduction of nitrobenzene is one of the ost important intermediates used in the production of the direct otton dyes. The production of benzidine base in 1922 totaled 35,669 pounds, and that of sulphate and hydrochloride totaled 46,294 pounds. The combined production of benzidine base and lts in the previous year was 328,577 pounds.

The production of phenol represents one of the larger increases of he year, totaling in 1922, 1,285,978 pounds, with total sales of 1,266,552 ounds, valued at $268,311. The large war stocks of Government henol on hand at the signing of the armistice were about 35,000,000 ounds. This represents a carry over from the war production, hich in 1918 exceeded 106,000,000 pounds. Contrary to the xpectation of the trade these war stocks were exhausted during the tter part of 1922, and a scarcity developed on the open market. nfortunately the synthetic phenol plants built during the war were most entirely dismantled and neither the tar distillers nor the nthetic phenol manufacturers were prepared for the demand. At ast one new synthetic phenol plant has commenced production, and veral other firms are expected to enter the field in 1923. Now that

the uncertainty as to the carried-over stocks is removed, it is probable that a balance of production of phenol from coal tar and from synthetic plants will be established. Future domestic requirements will probably be supplied from the two sources—coal tar and synthetic—as the domestic production from tar has not been sufficient to date for the entire domestic needs.

The production of salicylic acid U. S. P. totaled 3,085,882 pounds in 1922. This acid is extensively consumed in the manufacture of pharmaceuticals as well as for certain mordant and direct cotton dyes.

Toluene derivatives.—The production of the various toluidines showed an increase in 1922. This class of intermediates is used in the production of such important dyes as Magenta, Safranine, the Primulines and Indamines. The production of o-toluidine was 742,268 pounds and that of p-toluidine was 793,690 pounds. Tolidine, which is used in the manufacture of direct cotton dyes, mostly reds and blues, showed a very large increase in output. The output of tolidine and salts in 1922 was 138,206 pounds. The production of benzoate of soda, which is largely used as a food preservative, was 566,349 pounds and the sales were 552,856 pounds with a value of $278,759. The price per pound receded from 57 cents in 1921 to 50 cents in 1922.

The production of m-nitro-p-toluidine was 118,972 pounds. This sold to the textile trade under the name of Fast red G base, for dyeing cotton a fast red.

Leukotrope W (dimethylphenylbenzylammonium disulphonic acid calcium salt) used in cotton printing for discharges on indigo-dyed fabrics, is now manufactured in this country in adequate quantities. This is one of the many products essential to the textile industry, but its consumption is not great either in quantity or value.

Cresylic acid.—The large output of refined cresylic acid is one of the significant stages in the development of intermediates. While the quantity produced in 1922 was not adequate to domestic consumption, it ranks among a small group of the leading intermediates by quantity of production. The production of ortho, meta, and para cresol showed a very large increase over the previous year.

Naphthalene derivatives.—The intermediates derived from naphthalene showed a large increase in quantity of output and a conspicuous decline in price, compared with the previous year. The new products reported are indicative of expansion and progress. The production of refined naphthalene reported to the Tariff Commission by firms primarily engaged in tar distillation totaled 17,419,998 pounds, compared with 13,553,777 pounds for 1921. The sales of naphthalene in 1922 were 14,059,838 pounds, valued at $794,435. This product ranked third of all intermediates in quantity of output for 1922. Statistics on the output of refined naphthalene at coke ovens are collected by the Geological Survey. The preliminary figures show a production from that source of 1,811,000 pounds of refined naphthalene.

The most important intermediate derived from naphthalene is b-naphthol, the output of which in 1922 was 3,255,901 pounds. This derivative is consumed in large amounts in the manufacture of a variety of dyes, color lakes, other intermediates, and in the direct production of para red on the fiber by the cotton dyers and printers. The average price was 24 cents per pound, a 38 per cent decrease from that of 1921.

H acid (1-amino-8-naphthol-3:6-disulphonic acid) ranks second among the naphthalene derivatives and is one of the leading intermediates used in the production of direct cotton and acid dyes of the azo class. The production in 1922 was 2,208,657 pounds; the sales were 958,397 pounds, valued at $701,612. The average price decreased from 95 cents in 1921 to 73 cents in 1922.

Phthalic anhydride is an intermediate of great importance to a well-developed industry, as it is used in the manufacture of synthetic anthraquinone, which, in turn, is used for the preparation of alizarin and many vat dyes. It is also used in the production of fluorescein, the eosine dyes and the rhodamines. The production in 1922 was the highest on record, reaching 1,629,182 pounds, an increase of several hundred per cent over that of 1921.

The production of naphthionic acid (1-naphthylamine-4-sulphonic acid) was 1,194,677 pounds. The price was 39 cents, compared with 44 cents for the previous year. The output of 1-amino-2-naphthol-4-sulphonic acid, used largely in the manufacture of Salicine black U was 646,502 pounds. a-Naphthylamine (refined), used in the preparation of Fast red B, Sulphoncyanine, Diamond black F, and other azo blacks, recorded an increase in production for 1922. The production of R acid (2-naphthol-3:6-disulphonic acid) increased to 464,918 pounds. This is used in the preparation of Ponceau R, Amaranth, Fast red B, and Palatine chrome red B.

Gamma acid (2-amino-8-naphthol-6-sulphonic acid) used in the manufacture of direct cotton dyes, including Diamine black BH, Diamine brown M, and Diamine fast red F, showed a total output of 197,236 pounds, a decrease from 218,717 pounds in 1921. The price decreased from $2.10 in 1921 to $1.72 in 1922. The production of 2-naphthylamine-1-sulphonic acid, used for Lithol red R, increased to 217,752 pounds; alpha and beta-naphthylamine also showed marked increases.

The production of 1-naphthylamine-6 and 7-sulphonic acid, used for the preparation of Sulphoncyanine and Columbia black, totaled 323,348 pounds, an increase of several hundred per cent.

Of the intermediates, used in the production of the fast or special dyes consumed in smaller quantities, two products deserve mention, namely Chicago acid (1-amino-8-naphthol-2:4-disulphonic acid) and J acid (2 amino-5-naphthol-7-sulphonic acid). J acid is required in the preparation of certain direct cotton dyes distinguished by their fastness to acids. It was first reported in 1920; its production in 1922, totaling 92,919 pounds, was a large increase. Chicago acid is used in the production of Chicago blue 4B, RW. and Brilliant benzo blue 6B; its output in 1922 was 58,182 pounds.

Anthracene derivatives.—The production of anthracene derivatives is of particular interest in tracing the progress of the American dye industry, as the preparation of the fast vat dyes (including the indanthrenes and most of the algol colors) and alizarin and its derivatives require anthraquinone as a raw material. Anthraquinone is made by two methods: (1) Oxidation of anthracene; (2) synthesis from phthalic anhydride and benzene. Both methods are in use in this country. In 1922 there was a very large increase in the output of anthracene, production in that year totaling 251,950 pounds. The production of anthraquinone likewise showed a large gain to 395,107 pounds, an increase of several hundred per cent over that of the

previous year. A considerable part of the total output of anthraquinone is made by the synthetic process. In 1923 a new firm began to produce synthetic anthraquinone in large quantities. The increased production of this intermediate insures dye makers a supply sufficient to meet any increase in their output of vat and alizarine dyes.

There was a large gain in the output of various anthraquinone derivatives used in making vat dyes, especially silver salt and b-amino-anthraquinone.

New intermediates.—Of the 280 coal-tar intermediates reported in 1922, there were 85 for which no production was shown in 1921. These are, in the main, products of great complexity whose manufacture presents technical problems. The new intermediates include products derived from benzene, toluene, naphthalene, and anthracene. Among such new products are naphtho-1 :8-sultam-2 :4-disulphonic acid, amino benzoyl-J acid, ethyl hydrol, diphenylguanidine, ditolydiamide of methane, ethylidene aniline, dichlorophenylhydrazine sulphonic acid, benzyl benzoic acid, 5 :5 dihydroxy 7 :7-disulphonic-2 :2-dinaphthyl urea, 5 :5-dihydroxy-2 :2 dinaphthylamine-7 :7-disulphonic acid.

TABLE 5.—*Production and sales of coal-tar intermediates, 1922.*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 117. An X signifies that the corresponding intermediates were made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there were sales of the corresponding intermediates in the United States during 1922, but that the figures can not be published without revealing information in regard to the sales of individual firms. The blank space in the sixth column indicates that there was actual production of the corresponding intermediates in the United States during 1922, but that the figures can not be published without revealing information in regard to the output of individual firms. The details thus concealed are, however, included in the totals. Reports have been received from all firms known to be manufacturers.]

GROUP II.

Common name.	Manufacturers' identification numbers according to list on page 117.	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Total intermediates		58,004,435	$12,910,486	$0.22	165,048,155
Acetanilide, tech	23, 118, 124, 165			.21	1,415,127
Acetyl-p-phenylenediamine (p-amino acetanilide)	64, 77, 79, 84, 127				110,039
Acetyl-p-toluidine	38, 64, 165				144,652
b-Amino anthraquinone	64, 127, 129				
Aminoazobenzene	30, 38, 65, 84, 85, 127, 165			.61	153,968
Aminoazobenzene mono sulfonic acid	64				
Aminoazobenzene disulfonic acid	127				
Aminoazotoluene	4, 30, 38, 84, 85, 127, 130, 151.				181,023
Aminoazotoluene sulfonic acid	130				
p-Aminobenzoic acid	89, 122, 164				3,824
o-Amino-p-chlorophenol	198				
p-Amino dimethylaniline	81				
Aminodiphenylamine sulphonic acid	198				
p-Aminodiphenylamine o-sulfonic acid	4				
1-Amino-2-naphthol-4-sulfonic acid	4, 38, 64, 84, 127, 130, 165, X.				646,502
1-Amino-8-naphthol-4-sulfonic acid	38, 127, 129				107,163
1-Amino-8-naphthol-2 : 4-disulsulfonic acid (Chicago acid)	64, 127, 129				38,182
1-Amino-8-naphthol-3 : 6-disulfonic acid (H acid)	23, 64, 84, 121, 127, 129, 164.	958,397	701,612	.73	2,208,657

LE 5—*Production and sales of coal-tar intermediates, 1922*—Continued.

GROUP II—Continued.

mmon name.	Manufacturers' identification numbers according to list on page 117.	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
aphthol-7-sulfonic id).	38, 64, 127, 129				92,919
naphthol-7-sulfonic no benzoyl derivative	64				
naphthol-6-sulfonic ma acid).	23, 38, 64, 127, 129	62,972	$108,202	$1.72	197,236
nol	79, 164, 193, 198	13,452	27,901	2.73	13,083
nol and hydrochlor-	56, 64, 68, 79, 89, 129, 164, 193, 198, 203, X.	33,021	36,318	1.10	220,383
nol-p-sulfonic acid	4, 84, 127, 198				19,104
nol disulfonic acid	130				
yltolylamine sulfonic and salt.	38, 129				
lic acid	52, 127, 130				23,572
lic acid, diazo	64				
maldehyde aniline	X				
nzene thiazol and s.	X				
	25, 64, 83, 118, 120, 124, 127, 128.	12,064,465	1,827,941	.15	21,401,864
rochloride	25, 83, 127, 128	821,315	180,021	.22	825,558
ate	64, 85, 127, 128, 147			.29	289,913
lfonic acid	64, 127				
	64, 129				
sulfonic acid	64				
refined, 100 per cent.	16, 64, 183				251,950
(o-aminobenzoic)	63, 64, 124, 188			1.31	36,603
one, 99–100 per cent.	18, 64, 127, 183, X			1.34	395,107
one-1:5-disulphonic	84, 127				
one-2:7-disulfonic acid	18				
one-2-sodium sulver salt).	9, 18, 64, 129				394,304
	127				
id	58				
de	75, 101, 138, 190, X, X	135,109	105,030	.78	156,502
ne	9, 64, 129				60,355
ase	6, 30, 34, 38, 64, 75, 84, 127, 129.	201,768	167,479	.83	685,669
ulphate and hydro-	2, 84, 127, 129, X				446,294
soda	91, 164, X, X, X	552,856	278,759	.50	566,349
, U. S. P	29, 75, 91, 164, X, X, X	63,926	35,370	.55	104,469
, tech	164				
zoic acid	129				
ride	91, X				
iol	101, 164, 176, 190, X	7,239	8,683	1.20	3,373
e	X				
oic acid	127				
ide	138, 190				
acid. (*See* 2-naph-6-sulphonic acid.)					
ne	63				
raquinone	9				
aldehyde	127				
nthrone	64				
ne (mono)	91, 105, X	3,542,688	262,111	.07	4,151,312
ilic acid	77, 130				
taphenylenediamine ic acid.	130				
halene	X				
linitrobenzene-4-sul- d.	198				
ene	127				
ene sodium sulphon-	64				
luidine-4-sulphonic	117, 165				
ic acid. (*See* 1:8-dinaphthalene-3:6-diacid.)					
id	101, 176, 190, X, X	515	1,642	3.19	1,138

TABLE 5.—*Production and sales of coal-tar intermediates, 1922*—Continued.

GROUP II—Continued.

Common name.	Manufacturers' identification numbers according to list on page 117.	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Cresol, ortho, meta, and para	114				
o-Cresol, purity of 90 per cent or more.	16				
o-Cresotinic acid	X				
Cresylic acid, refined	16				
Cumidine	127				
Dehydrothio-p-toluidine sulphonic acid.	70, 129, X				29,[illegible]
Di (2-amino-5-naphthol-7-sulphonic) urea J acid.	64, 129				
Diaminostilbene disulphonic acid	70, 127, 129				29,[illegible]
Dianisidine	38, 64, 127, 129				
1-Diazo-2-naphthol-4-sulphonic acid.	4, 38, 127, 130				171,[illegible]
Dibenzanthrone	129				
Dibenzylaniline	64				
2:5-Dichloroaniline	198				
2:5-Dichloroaniline sulphonic acid.	147, 198				
Dichlorobenzene	64, 91, 105, 129, 134, X	951,574	$151,601	$0.16	1,124,[illegible]
Dichlorobenzidine	38				
Dichloro-phenylhydrazine-sulphonic acid.	147				
Diethyl-m-aminophenol	64				
Diethylaniline	89, 127, 178				42,[illegible]
Diethylaniline sodium sulphonate.	64				
5:5-Dihydroxy-2:2-dinaphthylamine-7:7-disulphonic acid.	64				
5:5-Dihydroxy-7:7-disulphonic-2:2-dinaphthyl urea (I acid urea).	127				
1:5 Dihydroxynaphthalene	84				
1:8 Dihydroxynaphthalene-3:6-disulphonic acid (chromotropic acid).	4, 64, 121, 127, 129			1.10	78,[illegible]
Dimethylaminobenzene	150				
Dimethylaniline	6, 25, 30, 64, 81, 127	1,237,149	397,517	.32	2,327,[illegible]
Dimethylphenylbenzyl ammonium disulphonic acid, calcium salt (Leukotrope W).	X				
Dinitroanthraquinone	18				
Dinitrobenzanthrone	129				
Dinitrobenzene	12, 25, 64, 127, 193, 201	792,284	155,419	.20	2,066,[illegible]
m-Dinitrobenzene	64				
Dinitrochlorobenzene	12, 64, 84, 105, 127	179,374	38,069	.21	6,243,[illegible]
Dinitrochlorobenzene-p-sulphonic acid.	130				
Dinitronaphthalene	129				
Dinitrohydroxy diphenylamine	38				
Dinitrophenol, and sodium salt	12				
Dinitrotoluene	12, 64, 65, 78, 85, 98, 127	1,009,520	166,660	.17	2,098,[illegible]
Diphenylamine	64				
Diphenyldiamide of methane	64				
Diphenylguanidine	64, 127, X				
Diphenylmethane sulphonate	127				
Distilbenediphenol	127				
p-Ditolyldiamide of methane	64				
Ditolylmethane	127				
Ditolylthiourea	81, 127				
Ethyl acetanilide	127				
Ethyl-p-aminoacetanilide	127				
Ethylaniline	127				
Ethylbenzylaniline	34, 64, 89, 127, 178	29,793	37,273	1.25	129,340
Ethylbenzylaniline sulphonic acid.	34, 77, 127				
Ethyl salicylate	189				
Ethylidene aniline	128				
Fluorescein	55, 85, 127, 150				
Formaldehyde-p-amino-dimethylaniline.	81				
Formanilide	165				
Gamma acid. (*See* 2-amino-8-naphthol-6-sulphonic acid.)					

TABLE 5.—*Production and sales of coal-tar intermediates, 1922*—Continued.

GROUP II—Continued.

Common name.	Manufacturers' identification numbers according to list on page 117.	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
H acid. (*See* 1-amino-8-naphthol-3:6-disulphonic acid.)		*Pounds.*			*Pounds.*
Heptylidene aniline	128				
b-Hydroxy naphthoic acid	38, 64, 84				47,124
b-Hydroxy naphthoic anilide (naphthol AS).	64, 84, 127	27,587	$77,381	$2.81	36,115
b-Hydroxy naphthoic toluide	64				
p-Hydroxy phenylarsonic acid	58				
p-Hydroxy phenyl arsonic acid and sodium salt.	116				
Indanthrene R-S	129				
Indophenols	105, 127, X				
Laurent's acid. (*See* 1-naphthylamine-5-sulphonic acid.)					
Metanilic acid	4, 38, 64, 65, 84, 85, 127, 130.			.42	277,071
Methyl ester of p-tolylsulphonic acid.	127				
Methylene dianilide	64				
Methylene diphenyldiamine	X				
Michler's hydrol. (*See* tetramethyldiaminobenzhydrol.)					
Michler's ketone. (*See* tetramethyldiaminobenzophenone.)					
Monoethylaniline	34, 64, 89				
Monoethyl-m aminophenol	64				
Monomethylaniline	64				
Mononitrochlorobenzene, mixed ortho and para.	64				
Naphthalene, solidifying 79° C. or above (refined, flake).	13, 16, 20, 25, 32, 33, 111, 129, 180, 199.	14,059,838	794,435	.06	17,419,998
1:5-Naphthalene disulphonic acid	84, 129				
2:7-Naphthalene disulphonic acid	127				
Naphtho-1:3-sulton-8-sulphonic acid.	38				
Naphtho-1:8-sultam-2:4-disulphonic acid.	38, 64				
a-Naphthol	30, 38, 85, 92, 127, 169, 182.	41,196	36,755	.89	229,240
b-Naphthol, U. S. P	25, 148				
b-Naphthol, tech	25, 30, 38, 85, 148, 165, 169.	2,530,317	604,800	.24	3,255,901
1-Naphthol-8-chloro-3:6-disulphonic acid (Chlor H acid).	127				
1-Naphthol-4-sulphonic acid (Neville & Winther's acid).	2, 6, 30, 52, 64, 127, 129, 130.	52,318	50,423	.96	334,740
1-Naphthol-5-sulphonic acid	4, 64, 127, 129, 130				61,765
1-Naphthol-3:6-disulphonic acid	165				
1-Naphthol-3:6:8-trisulphonic acid.	30, 127, 129				
2-Naphthol-1-sulphonic acid	148				
2-Naphthol-6-sulphonic acid (Schaeffer's acid).	4,38,64,65,127,130,165	26,116	14,795	.57	78,320
2-Naphthol-7-sulphonic acid	38, 165, 181	17,299	29,275	1.69	
2-Naphthol-8-sulphonic acid	38, X				
2-Naphthol-3:6-disulphonic acid	2, 4, 23, 25, 30, 38, 64, 84, 127, 129, 165, 188, 195.	87,496	48,592	.56	464,918
2-Naphthol-6:8-disulphonic acid	4, 25, 30, 38, 64, 127, 165				94,206
a-Naphthylamine, crude	64, 129				
a-Naphthylamine, refined	16, 64, 129	775,277	219,112	.28	
a-Naphthylamine and hydrochloride.	150				
b-Naphthylamine and hydrochloride.	38, 64, 127, 148, 150			.86	322,716
1-Naphthylamine-4-sulphonic acid (naphthionic acid).	2, 6, 30, 38, 52, 64, 85, 127, 129, X.	139,762	55,016	.39	1,194,677
1-Naphthylamine-5-sulphonic acid (Laurent's acid).	4, 30, 64, 84, 85, 127, 130				62,213
1-Naphthylamine-6-sulphonic acid	127				
1-Naphthylamine-6 and 7-sulphonic acid.	38, 64, 127, 129				323,348
1-Naphthylamine-8-sulphonic acid	4, 64, 84, 127, 130				175,302
1-Naphthylamine-3:8-disulphonic acid.	38, 64, 129				38,345

TABLE 5.—*Production and sales of coal-tar intermediates, 1922*—Continued.

GROUP II—Continued.

Common name.	Manufacturers' identification numbers according to list on page 117.	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
1-Naphthylamine-4:8-disulphonic acid.	38, 64, 127, 129				268,632
1-Naphthylamine-3:6:8-trisulphonic acid.	23, 64, 84, 127, 129				2,433,308
1-Naphthylamine-8-hydroxy-4-sulphonic acid.	64				
2-Naphthylamine-1-sulphonic acid.	4, 26, 38, 148, 165	137,692	$152,976	$1.11	217,732
2-Naphthylamine-6 sulphonic acid (Broenner's acid).	38, 127				
2-Naphthylamine-4:8-disulphonic acid.	38, 64, 129				103,435
2-Naphthylamine-5:7-disulphonic acid.	38, 64, 127, 129				154,603
2-Naphthylamine-6:8-disulphonic acid.	38, 64, 129				206,725
Neville & Winther's acid. (*See* 1-naphthol-4-sulphonic acid).					
p-Nitroacetanilide	23, 38, 127, 164, 165	33,906	13,935	.41	129,235
Nitroaminophenol	130, 198				
m-Nitroaniline	64, 193				
o-Nitroaniline-p-sulphonic acid	198				
p-Nitroaniline	6, 23, 164, 165, 185	1,113,866	770,703	.68	1,362,665
p-Nitroaniline-o-sulphonic acid	4, 64, 77, 84, 165, 198			.48	34,197
o-Nitroanisole	64, 127, 129				
Nitro arsanilic acid	122				
Nitrobenzene (oil of mirbane)	25, 64, 83, 127, 128, 129	2,005,399	189,113	.09	37,333,561
Nitrobenzene sulphonic acid	130				
Nitrobenzidine sulphate	129				
p-Nitrobenzoic acid	1, 64, 164				14,234
p-Nitro benzoyl chloride	64				
o-Nitrochlorobenzene	64, 124, 127				290,163
o-Nitrochlorolbenzene sulphonic acid.	130, 198				
p-Nitrochlorobenzene	64, 124, 127	447,514	82,981	.19	432,613
p-Nitrochlorobenzene-o-sulphonic acid.	4, 38, 64, 127, 198				90,629
p-Nitrodichlorobenzene	198				
o-Nitro-p-chlorophenol	198				
8-Nitro-1-diazo-2-naphthol-4-sulphonic acid.	38, 64, 84				
3-Nitro-4-hydroxyphenyl arsonic acid.	58, 116, 122				2,154
Nitronaphthalene	16, 64, 129			.29	1,023,490
1-Nitronaphthalene-4:8-disulphonic acid.	38				
o-Nitrophenol	181, 193, 198	5,284	3,699	.70	
p-Nitrophenol	64, 124, 181, 193, 198	8,613	4,636	.54	107,940
Nitrosobetanaphthol	84, X				
Nitrosodimethylaniline and hydrochloride.	25, 46, 64, 84, 90, 105, 127, 128, 129, 150.				94,851
Nitrosophenol	12, 18, 46, 68, 84, 90, 105, 127, 185, X.				213,786
Nitrosulphoanthrarufin	127				
Nitrotoluene	12, 64, 65, 78, 85, 98, 127, 129.				7,222,307
o-Nitrotoluene	12, 38, 64, 78, 98, 127, 129	379,527	20,912	.06	3,230,282
o-Nitrotoluene sulphonic acid	77				
p-Nitrotoluene	12, 64, 78, 98, 127, 129	229,154	109,452	.48	1,932,850
p-Nitrotoluene-o-sulphonic acid	4, 64, 127, 129, 198				473,250
m-Nitro-p-toluidine	38, 64, 165	117,161	255,634	2.18	118,972
p-Nitro-o-toluidine	38, 64, 188				12,471
Nitrocylene	61				
Oxalyl-arsanilic acid	122				
Oxalyl-p-nitroaniline	64				
Oxalyl-m-phenylenediamine	64				
Oxalyl-p-phenylenediamine	64				
Phenol	16, 114, 144, 181, X	1,266,552	268,311	.21	1,285,978
Phenolate of soda	64				
Phenol sulphonic acid	150, 198				
Phenol disulphonic acid	150				
Phenyl cresyl phosphate	161				
Phenylglycine, sodium salt	63, 64, 127				5,832,701
Phenylhydrazine-p-sulphonic acid.	25, 64, 147, 181				148,850

TABLE 5.—*Production and sales of coal-tar intermediates, 1922*—Continued.

GROUP II—Continued.

Common name.	Manufacturers' identification numbers according to list on page 117.	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Phenylmethylpyrazolone	64				
Phenyl-a-naphthylamine	23, 64				
Phenyl-1-naphthylamine-8-sulphonic acid.	4, 64, 84, 127, 130	387	$484	$1.25	124,077
Phenyl rosinduline and sulfate	64				
m-Phenylenediamine	4, 12, 25, 30, 34, 38, 84, 85, 127, 193.	41,665	33,619	.81	636,646
m-Phenylenediamine, crude	64, 129				
m-Phenylenediamine sulphonic acid.	64				
p-Phenylenediamine and hydrochloride.	64, 79, 164, 165, 185	308,884	428,858	1.39	342,111
Phthalamide	124, 188				
Phthalic acid and anhydride	64, 124, 127, X	1,317,625	461,944	.35	1,629,182
Picramic acid	23, 25, 64, 127, X	26,889	14,250	.53	138,365
Primuline, base	77, 127, 143				204,563
Pyrazolone	130, 147				
Quinone	X				
Resorcinol, U. S. P	62, 144, X				
Resorcinol, tech	127, 144				
Salicylic acid, U. S. P	63, 120, 124, X, X	1,882,757	453,814	.24	3,085,882
Salicylic acid, tech	120, 124, X, X	42,270	9,410	.22	336,362
Sulphanilic acid	6, 25, 30, 38, 64, 85, 127, 147, 181, 193.	154,448	29,392	.19	1,515,421
o-Sulphobenzoic acid	96				
o-Sulphobenzoic acid, ammonium salt.	96				
o-Sulphobenzoic acid, chloride of.	96				
Tetrachlorofluorescein	85				
Tetrachlorophthalic anhydride	64				
Tetraethyldiaminobenzhydrol (ethyl hydrol).	127				
Tetraethyldiaminodiphenylmethane.	127				
Tetramethyldiaminobenzhydrol (Michler's hydrol).	64, 77				
Tetramethyldiaminobenzophenone (Michler's ketone).	23, 64				
Tetramethyldiaminodiphenylmethane.	64, 84, 127				192,132
Thiosniline	4				
Thiocarbanilide	81, 127, 128, 159, X	938,921	258,856	.27	2,591,856
Toluidine and salts	38, 64, 127, 129				138,206
Toluidine base, crude	129				
Toluidine disulphonic acid	X				
o-Toluene sulphamide	X				
p-Toluene sulphamide	X				
p-Toluene sulphochloride	29, 124				
p-Toluenesulpho ethyl ester	127				
Toluidine	64, 78, 127, 129	14,389	5,088	.35	
o-Toluidine	12, 38, 64, 78, 98, 127, 129	321,988	57,586	.18	742,268
o-Toluidine sulphonic acid	64, 84, 127, 181				
p-Toluidine	12, 38, 64, 78, 98, 127, 129	282,143	187,828	.67	793,690
p-Toluidine, crude	64				
p-Toluidine sulphonic acid (meta and ortho).	38, 64, 198				10,464
1-Tolyl-1-naphthylamine-8-sulphonic acid.	127				
m-Tolylenediamine	4, 6, 12, 30, 38, 64, 65, 84, 85, 127, 129, 203.	291,408	275,051	.94	958,761
m-Tolylenediamine sulphate	127				
m-Tolylenediamine sulphonic acid.	127, 129				
p-Tolylenediamine	12				
Triphenylguanidine	127, 128				
Tricresyl phosphate	161, X				
Triphenyl phosphate	161, 174				
Xylidine, mixed	64				
Xylidine and salt	25, 38, 127, 129	142,317	46,676	.33	
All other intermediates	23, 129				

TABLE 6.—*Comparison of production of coal-tar intermediates, 1921 and 1922.*

Name.	Total production.	
	1922	1921
	Pounds.	*Pounds.*
Total intermediates	165,018,155	70,989,912
Acetanilide, tech	1,418,127	1,157,713
Acetyl-p-phenylenediamine (p-amino acetanilide)	110,039	84,742
Aminoazobenzene	153,968	49,783
Aminoazotoluene	181,023	35,857
1-Amino-2-naphthol-4-sulphonic acid	646,502	449,996
1-Amino-8-naphthol-3:6-disulphonic acid (H acid)	2,208,657	1,639,373
2-Amino-8-naphthol-6-sulphonic acid (gamma acid)	197,236	218,717
o-Aminophenol	13,083	12,775
p-Aminophenol and hydrochloride	220,383	72,571
Aniline oil	21,401,864	5,639,234
Anthranilic acid (o-aminobenzoic acid)	36,603	35,616
Anthraquinone	395,107	175,359
Benzaldehyde	156,502	66,365
Benzidine base and sulphate	1,131,903	328,577
Benzoate of soda	566,349	381,154
Benzoic acid, U. S. P	104,469	190,483
Benzyl alcohol	3,373	17,132
Chlorobenzene (mono)	4,151,312	1,692,624
Cinnamic acid	1,138	778
Dehydrothio-p-toluidine sulphonic acid	29,112	18,204
Diaminostilbene disulphonic acid	70,433	66,909
Diethylaniline	42,040	32,812
Dimethylaniline	2,327,561	566,286
Dinitrobenzene	2,066,367	894,209
Dinitrochlorobenzene	6,243,116	2,408,472
Dinitrotoluene	2,098,252	1,065,321
Ethylbenzylaniline	179,340	16,949
Metanilic acid	277,071	50,647
Naphthalene, solidifying 79° C. or above (refined flake)	17,419,998	13,553,777
a-Naphthol	229,240	95,725
b-Naphthol, tech	3,255,901	2,939,049
1-Naphthol-4-sulphonic acid (Neville & Winther's acid)	334,740	182,595
1-Naphthol-5-sulphonic acid	61,765	92,571
2-Naphthol-6-sulphonic acid (Schaeffer's acid)	78,320	168,835
2-Naphthol-3:6-disulphonic acid	464,918	322,902
2-Naphthol-6:8-disulphonic acid	94,206	396,926
b-Naphthylamine and hydrochloride	322,716	102,679
1-Naphthylamine-4-sulphonic acid (naphthionic acid)	1,194,677	837,850
1-Naphthylamine-5-sulphonic acid (Laurent's acid)	62,213	166,616
1-Naphthylamine-8-sulphonic acid	175,302	533,755
1-Naphthylamine-4:8-disulphonic acid	298,032	260,823
1-Naphthylamine-3:6:8-trisulphonic acid	2,433,508	2,026,003
2-Naphthylamine-1-sulphonic acid	217,752	149,014
2-Naphthylamine-6:8-disulphonic acid	206,728	247,337
p-Nitroacetanilide	129,238	288,748
p-Nitroaniline	1,563,665	832,628
p-Nitroaniline-o-sulphonic acid	54,197	64,480
Nitrobenzene (oil of mirbane)	37,833,551	7,443,192
p-Nitrochlorobenzene	432,618	51,774
p-Nitrophenol	107,940	86,216
Nitrosodimethylaniline	94,831	104,690
Nitrosophenol	213,786	111,681
Nitrotoluene	7,222,307	2,342,098
o-Nitrotoluene	3,230,382	727,177
p-Nitrotoluene	1,932,850	596,351
p-Nitrotoluene-o-sulphonic acid	475,250	321,264
m-Nitro-p-toluidine	118,972	70,094
Phenyl-l-naphthylamine-8-sulphonic acid	124,077	204,647
m-Phenylenediamine	636,646	301,169
Picramic acid	138,305	254,904
Salicylic acid U. S. P	3,085,882	1,722,575
Salicylic acid, tech	336,362	1,777,732
Sulphanilic acid	1,515,421	1,071,904
Thiocarbanilide	2,591,856	1,185,461
o-Toluidine	742,268	268,505
p-Toluidine	793,690	268,629
m-Tolylendiamine	958,761	621,359

TABLE 7.—*Comparison of imports of dyes, by classes, fiscal year 1914 with domestic production, calendar years 1917–1922.*

Class.	1914		1917		1918	
	Imports.	Per cent of total.	United States production.	Per cent of total.	United States production.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
Acid	9,286,501	20.2	9,372,121	20.4	9,709,071	16.8
Basic	3,002,480	6.5	2,073,043	4.5	2,879,639	4.9
Direct	10,264,757	22.3	11,181,761	24.3	12,285,683	21.1
Lake and spirit-soluble	1,512,605	3.3	934,360	2.2	1,068,466	1.8
Mordant and chrome	4,450,442	9.7	4,161,902	9.1	5,447,192	9.3
Sulphur	7,053,879	15.4	15,588,222	33.9	23,693,826	40.5
Vats (including indigo)	10,352,663	22.5	289,296	.6	3,281,337	5.6
(a) Indigo	8,407,359	18.3	274,771	.55	3,083,888	5.3
(b) Other vats	1,945,304	4.2	14,525	.05	197,449	.3
Unclassified	27,568	.1	2,368,541	5.0	4,232	.....
Total	45,950,895	100.0	45,977,246	100.0	58,464,446	100.0

Class.	1919		1920			
	United States production.	Per cent of total.	United States production.	Per cent of total.	Imports.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*	
Acid	12,195,968	19.2	17,741,538	20.1	733,405	21.5
Basic	4,036,532	6.4	4,993,001	5.7	192,163	5.7
Direct	14,444,934	22.8	19,882,631	22.5	571,581	16.8
Lake and spirit-soluble	1,813,199	2.8	2,205,281	2.5	17,527	.5
Mordant and chrome	3,985,050	6.3	3,900,209	4.4	709,482	20.9
Sulphur	17,624,418	27.8	20,034,500	22.7	229,140	6.7
Vats (including indigo)	9,252,982	14.6	19,338,099	21.9	932,464	27.4
(a) Indigo	8,863,824	14.0	18,178,231	20.6	171,101	5.0
(b) Other vats	389,158	.6	1,159,868	1.3	761,363	22.4
Unclassified	49,111	.1	168,517	.2	16,820	.5
Total	63,402,194	100.0	88,263,776	100.0	3,402,582	100.0

Class.	1921				1922			
	United States production.	Per cent of total.	Imports.	Per cent of total.	United States production.	Per cent of total.	Imports.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Acid	7,843,009	20.11	1,455,823	34.24	9,880,014	15.29	601,395	15.10
Basic	1,853,094	4.75	163,527	3.84	2,937,585	4.54	155,084	3.89
Direct	7,053,761	18.08	537,664	12.64	11,931,737	18.46	671,621	16.86
Lake and spirit-soluble	720,406	1.85	43,553	1.02	1,009,512	1.56	76,853	1.93
Mordant and chrome	3,997,442	10.25	695,961	16.36	3,749,701	5.80	716,790	18.00
Sulphur	10,239,255	26.25	220,938	5.20	16,913,767	26.17	194,883	4.89
Vats (including indigo)	7,019,120	17.99	1,116,345	26.25	16,926,744	26.19	1,549,024	38.90
(a) Indigo	6,673,968	17.11	70,975	1.66	15,850,752	24.52	505	.01
(b) Other vats	345,152	.88	1,045,370	24.59	1,075,992	1.67	1,548,519	38.89
Unclassified	282,603	.72	19,100	.45	1,283,127	1.99	16,981	.43
Total	39,008,690	100.00	4,252,911	100.00	64,632,187	100.00	3,982,631	100.00

DYES AND OTHER FINISHED COAL-TAR PRODUCTS.

INTRODUCTORY.

The finished coal-tar products are divided into the following eight classes: (1) Dyes, (2) color lakes, (3) photographic chemicals (developers), (4) medicinals, (5) flavors, (6) perfume materials, (7) synthetic

phenolic resins, (8) synthetic tanning materials. In previous reports[1] the Tariff Commission has emphasized the close relationship that exists between the manufacture of explosives, poison gases, and dyes and the fact that many explosive plants since the signing of the armistice have been converted into dye factories. During the war the dye plants of Germany supplied the army of that country with poison gases and explosives. The dye industry is also closely connected with the manufacture of flavors, perfume materials, photographic chemicals, medicinal, and other coal-tar products, which, although produced in smaller quantities than dyes, use many of the by-products obtained in the manufacture of coal-tar dyes.

The production of dyes and other finished products in 1922 is shown in Table 10 in as great detail as is possible without revealing the output of individual manufacturers.

The total output of dyes and other finished coal-tar chemicals by 164 firms was 88,368,131 pounds compared with 51,457,565 pounds by 147 firms in 1921. The total sales amounted to 93,370,065 pounds, with a value of $57,067,326. The 1922 production represents a 72 per cent increase in quantity compared with 1921, and sales constitute 54 per cent increase over that of the previous year.

DYES—SUMMARY OF PRODUCTION IN 1922.

Increased production.—The domestic production of dyes by 87 firms was 64,632,187 pounds, an increase of 66 per cent over that of the previous year. The sales totaled 69,107,105 pounds, valued at $41,463,790. The pre-war production of coal-tar dyes by 7 firms in 1914 was 6,619,729 pounds, valued at $2,470,096. These dyes were made almost entirely from intermediates imported chiefly from Germany.

The general increase in dye production during 1922 was largely due to the revival of business. Beginning about June, the textile and other dye-consuming industries became more active, and during the remaining months of the year the demand for dyes steadily increased. This increase was general, extending to dyes of all classes.

Large reduction in price of dyes.—A conspicuous feature of the dye industry in 1922 was the reduction of 28 per cent in the average price of all dyes from that of 1921. The average price of all dyes sold in the United States was 60 cents per pound compared with 83 cents in 1921 and $1.26 per pound in 1917.[2]

The substantial decrease in the selling price of dyes in 1922 is illustrated by the reduction in price of the important dyes which make up a large part of the total consumption. The average price of indigo was 24 cents compared with 45 cents in 1921, a 47 per cent decrease. Other dyes that declined in price in 1922 were Direct deep black EW, 47 per cent; Sulphur black, 9 per cent; Agalma black 10B, 28 per cent; Nigrosine, 22 per cent; and Salicine black U, 27 per cent.

[1] Census of Dyes and Coal-Tar Chemicals, 1917-1921.

[2] As stated in the 1917 census the import statistics show that for several years before the war artificial dyes imported into the United States annually were valued at between $9,000,000 and $10,000,000. Furthermore, it is probable that the cost of these dyes used in the United States to the primary consumers (textile mills, tanners, etc.) was not less than $20,000,000 nor more than $25,000,000 per year. The actual importation of dyes in 1914, as stated in the Norton Census, was 45,950,895 pounds. On the basis of the above values and the 1914 quantity imported, the cost of the dyes to the consumer was from 44 to 53 cents per pound, the invoice cost on the basis of invoice value of $10,000,000 would be 22 cents per pound.

Notable reductions in price also occurred in the case of the special and fast dyes. Indanthrene blue GCD declined 30 per cent; Alizarin, 20 per cent; Indanthrene dark blue BO, 29 per cent; Alizarin saphirol B, 34 per cent; Wool green S, 41 per cent; and Eosine, 24 per cent.

The reduction of 28 per cent in the average price of dyes from that of 1921 has occurred notwithstanding the development during 1922 and the production of new colors of greater value and complexity. These have tended to increase the average price per pound of all dyes produced.

Table 8 presents a comparison of the domestic sale prices of 100 dyes for the years 1917–1922, together with the invoice value of the same dyes imported during the year 1914. The colors for which statistics are given in this table represent about 90 per cent of the domestic production of dyes in 1922. It should be noted that the domestic sale prices are not directly comparable with the invoice values in 1914. Invoice values do not represent the cost to the consumer as they do not include the importer's profit, or in most cases "charges for containers and packing, freight, and insurance to seaport, consular certification, minor shipping charges at point of departure and at seaport."

The Schultz number as indicated in column 1 is that of "Farbstoff-Tabellen," by Gustav Schultz, 1914 edition. In column 2 is shown the common name of the dye as adopted by the Tariff Commission for designating all dyes reported under a given Schultz number (column 1). The invoice price (1914), as shown in column 3, represents the weighted average of all dyes classified under a given Schultz number in "Artificial Dyestuffs Used in the United States," Department of Commerce, Special Agents Series No. 121. These invoice prices are considerably below the price at which the dyes were sold to the consumer in this country. This weighted average value for all types is usually higher than the invoice price per pound for dyes representing the bulk of the importation under a given Schultz number. The individual dyes imported under given Schultz numbers in the Norton Census show a wide variation in price, frequently amounting to several hundred per cent. This is due chiefly to the great variation in the concentration of the different dyes and also to the variation in prices of special and pure brands, which are more costly than the ordinary brands. Column 4 gives the domestic sales price as reported to the Tariff Commission. This represents the weighted average price of all manufacturers for those dyes reported under a given Schultz number. Most of these prices were published in the "Census of Dyes and Coal-Tar Chemicals, for the years, 1917–1921."

TABLE 8.—*Domestic sale prices of dyes, 1917–1922, compared with invoice values of the same dyes imported, 1914.*

Schultz No.	Name.	1914 invoice value imported dyes (weighted average of all types).	Average price per pound.					
			1917	1918	1919	1920	1921	1922
9	Direct yellow R	$0.178	$2.55	$2.61	$1.74	$1.49	$1.07	$0.88
10	Stilbene yellow	.162	.....	.....	.....	1.53	1.22	.....
11	Chloramine orange G	.239	3.32	2.86	1.99	1.88	1.60	1.23
23	Tartrazine	.200	1.50	1.91	2.04	1.86	1.80	1.08
33	Chrysoidine Y	.136	1.09	.77	1.04	.87	.77	.65
34	Chrysoidine R	.165	1.22	1.22	1.12	.79	.78	.63
37	Croceine orange	.133	1.13	.89	.88	1.04	.86	.77
38	Orange G	.148	1.25	.92	1.04	1.22	.90	.88
42	Amido naphthol red G	.150	3.04	1.16	.97	1.78	1.46	.93
48	Alizarin yellow G	.077	.59	.68	.72	.63	.53	.50
58	Alizarin yellow R	.154	.83	.91	.84	.86	.69	.61
66	Amido naphthol red 6 B	.604	.....	.88	.81	1.51	1.25	.66
82	Ponceau 2 R	.095	1.15	.79	.80	.80	.73	.61
112	Bordeaux B	.159	1.46	1.02	.91	.93	.84	.75
119	Diamine rose	.411	.....	5.50	5.15	5.33	3.89	3.01
134	Metanil yellow	.164	2.24	1.61	1.65	1.64	1.20	.92
137	Acid yellow G	.176	1.32	.85	.....	.43	1.04	1.03
141	Azo yellow	.249	2.04	2.02	1.95	2.08	1.85	1.30
145	Orange II	.081	.98	.68	.63	.62	.51	.38
154	Palatine chrome brown	.256	1.90	2.00	1.68	1.55	1.53	1.34
157	Diamond black P. V	.130	.....	.....	.....	1.65	1.25	.....
161	Fast red A	.118	1.19	1.03	1.05	1.04	.96	.83
163	Azo rubine	.198	2.71	1.51	1.43	1.43	1.26	.92
164	Fast red V. R	.188	2.25	1.25	2.20	2.28	1.96	1.50
168	Amaranth	.138	1.31	.88	2.98	2.11	3.23	.86
169	Cochineal red	.127	1.44	1.16	1.32	1.26	.99	.79
173	Lithol red R	.083	1.25	2.38	.39	1.52	1.63	1.25
177	Mordant yellow	.149	.74	1.35	1.89	.81	.98	.76
181	Salicine black U	.156	2.92	1.62	1.25	1.10	.75	.55
188	Sulphon acid blue R	.252	2.25	2.25	2.02	1.95	1.67	.91
217	Agalma black 10 B	.134	1.08	1.26	1.47	1.29	1.09	.79
227	Brilliant croceine	.165	1.35	1.92	2.41	2.23	1.56	1.09
236	Wool red B	.143	2.50	2.10	2.67	2.64	1.41	1.02
257	Sulphon cyanine G	.166	2.25	2.25	2.21	2.26	1.74	1.21
265	Sulphon cyanine black	.110	2.25	2.10	1.91	1.80	1.48	1.14
266	Naphthylamine black D	.144	1.89	.84	1.01	.87	.94	.66
275	Diamond black	.172	2.50	1.40	1.48	1.55	1.25	.94
283	Bismark brown	.186	1.17	.81	1.01	.84	.78	.66
284	Bismark brown 2 R	.183	1.48	.97	1.04	.91	.85	.63
304	Chrysophenine G	.270	12.64	5.71	2.53	2.81	2.03	1.70
307	Congo red	.179	2.47	2.01	1.12	.86	.89	.65
327	Diamine violet N	.255	.....	.....	3.32	2.97	2.17	1.44
333	Oxamine black B H N	.133	2.50	3.25	2.72	2.49	1.48	.91
337	Benzo blue 2 B	.041	2.00	1.37	1.00	.88	.69	.48
340	Benzo orange R	.231	2.00	1.56	.88	1.07	.86	.89
342	Chrysamine G	.189	1.97	1.53	1.36	1.08	.99	.93
343	Diamine fast red F	.362	.....	.....	2.72	2.59	2.09	1.39
344	Diamine brown	.194	.....	2.60	2.20	1.99	1.65	1.19
363	Benzo purpurine 4 B	.133	2.82	2.46	1.80	1.46	1.20	.90
391	Benzo blue 3 B	.209	2.32	2.23	1.69	1.67	1.03	.78
405	Benzo purpurine 10 B	.234	.....	4.73	2.07	2.47	2.33	1.64
410	Benzazurine G	.267	.....	3.00	3.18	1.98	1.53	1.28
419	Chicago blue R W	.222	.....	.....	2.40	1.88	1.67	1.45
424	Chicago blue 6 B	.275	.....	.....	3.08	2.11	1.90	1.52
426	Benzamine pure blue	.440	5.00	4.40	1.97	2.43	1.39	1.22
462	Direct deep black E W	.144	.75	.85	1.04	1.03	.79	.42
463	Erie direct black R X	.139	.....	.....	1.04	.99	.71	.61
474	Oxamine green B	.174	2.30	2.20	1.85	1.51	1.21	.92
475	Oxamine green G	.230	2.16	2.09	2.14	1.20	1.03	.98
476	Benzamine brown 3 G O	.....	1.80	1.70	1.65	1.60	1.15	.73
477	Congo brown G	.194	2.00	2.25	1.83	1.58	1.45	.88
485	Benzo brown G	.170	1.80	1.50	1.23	1.39	1.06	.93
493	Auramine	.240	3.08	3.76	3.08	2.48	2.02	1.66
495	Malachite green	.241	6.28	5.60	3.26	3.32	1.97	1.22
499	Brilliant green	.221	.....	5.63	4.66	4.23	3.68	.....
502	Guinea green	.255	8.50	8.10	5.12	5.22	3.94	1.77
512	Magenta	.294	9.10	7.72	4.57	4.67	3.28	2.26
515	Methyl violet	.248	3.84	2.78	2.44	2.39	1.66	1.29
521	Aniline blue	.368	4.85	5.56	4.86	6.82	2.91	4.56
530	Acid violet	.281	8.50	7.00	4.93	5.20	3.64	1.86
536	Alkali blue	.409	4.71	8.33	6.35	5.90	3.42	2.42
543	Patent blue	.305	10.78	8.68	.....	.....	.....	.....
559	Victoria blue B	.312	11.91	8.46	3.65	5.14	3.86	.....
506	Wool green S	.353	6.98	.....	5.95	4.99	1.88	1.10
573	Rhodamine B	.415	10.00	15.92	6.90	6.72	.....	.....

BLE 8.—*Domestic sale prices of dyes, 1917–1922, compared with invoice values of the same dyes imported, 1914*—Continued.

iltz o.	Name.	1914 invoice value imported dyes (weighted average of all types).	Average price per pound.					
			1917	1918	1919	1920	1921	1922
587	Eosine	$0.418	$8.58	$7.81	$6.30	$4.19	$2.51	$1.90
306	Phosphine	.352	6.00	6.00	3.86	4.17	3.70	2.05
316	Primuline	.144	4.43	3.04	1.71	1.59	1.37	1.07
317	Columbia yellow	.136	3.00	3.56	2.66	2.36	1.59	1.29
326	Gallocyanine	.347	5.96	5.12	3.03	3.06	2.44	1.92
359	Methylene blue	.390	3.09	2.80	3.03	2.94	1.94	1.40
579	Safranine	.359	5.93	5.85	4.02	3.88	2.60	1.69
597	Induline (spirit soluble)	.198	5.41	1.46	.53	1.21	.75	.94
598	Nigrosine (spirit soluble)	.126	1.11	.71	.71	.88	.70	.54
699	Induline (water soluble)	.258	1.51	.70	.67	1.03	.96	.82
700	Nigrosine (water soluble)	.149	.80	.63	.59	.72	.68	.53
	Sulphur yellow		.99	1.09	.83	.71	.73	.78
720	Sulphur black	.100	.60	.29	.37	.25	.23	.21
	Sulphur blue		1.63	1.45	1.11	.98	.64	.60
725	Sulphur brown	.107	.55	.48	.47	.35	.38	.40
	Sulphur tan		.90	.65	.34	.47	.59	.56
739	Sulphur maroon	.186			1.23	1.62	.95	.79
763	Indanthrene dark blue B O	.227				2.12	2.31	1.65
778	Alizarin	.100	3.38	1.95	1.58	1.45	.65	
779	Alizarin orange	.224			1.45	1.46		
782	Alizarin brown	.290	.88	.80	1.58	1.68	1.32	1.86
842	Indanthrene blue G C D	.354			6.96	2.40	2.41	
849	Indanthrene yellow	.334			17.62	4.68	3.76	
874	Indigo synthetic	.128	1.42	.88	.59	.74	.45	.25
877	Indigo extract	.340	.38	.62	.64	1.00	.65	.26

Output of vat and alizarin dyes increases over 200 per cent.—The ge increase in the production of vat dyes which are used for dye- and printing fast shades on cotton goods, and to a less extent on , denotes great progress in the domestic dye industry. These es are derived from anthraquinone; they are of great complexity l their production presents serious difficulties. Their use steadily reases with the growing demand for fast shades; the increase in the ce of cotton goods also favors the use of more costly but better dyes. The production of this class of dyes is still below the domestic uirements, and further increases in output are therefore desirable. zarin, used in the production of the well-known Turkey red, and a mber of alizarin derivatives used in dyeing fast shades on wool, ow conspicuous increases. The total output of the anthraquinone es in 1922 was 1,234,963 pounds. The production of vat dyes ier than indigo in that year was 1,075,992 pounds, compared with ,152 pounds for 1921.

Many new dyes produced.—New dyes were produced in 1922 for ing silk, cotton, and wool. These include vats, the alizarins for ol, developed cotton dyes, mordant and acid colors. These dyes re previously imported; their production gives a more complete ge of fast and special colors of domestic origin for the textile ustries. Their manufacture was the result of laborious research l painstaking investigation both in the laboratory and in the dye nt, and the successful production is highly creditable to the in- try. Many other new dyes have been added to the manufacturing since January, 1923.

Part V of this report contains a list of the dyes imported in greatest antities during 1922. From this list may be deduced the deficien- s of the domestic industry in meeting the needs of the dye-con- ning manufacturers.

Quality of American dyes.—The satisfactory quality of American dyes is one of the evidences of marked progress made by the domestic industry. It can be stated conservatively that, dye for dye, with relatively few exceptions, the domestic products are the equal of the pre-war German product; in a few cases they are superior. Dyes of domestic manufacture are now supplying more than 90 per cent of the requirements of the textile and other dye-consuming industries.

In the early stages of the domestic dye industry, after the outbreak of the war, there was a lack of uniformity in the strength and quality of many dyes. This condition no longer prevails, as domestic manufacturers after much painstaking research are able to market dyes uniformly standardized and of high quality. This is one of the significant accomplishments of the domestic dye industry.

The manager of a large cotton printing, dyeing, and finishing concerns states: "In sharp contrast to the conditions that prevailed before the war, I may say that at the present time more than 90 per cent of the total poundage of dyes required to operate our plants are made in America. Type for type, they are the equivalent of the German product, and we are able to do fully as good work with the American dyes of the same type as we ever were able to do before the war when operating wholly with German dyes."

One of the largest silk manufacturing concerns reports that over 84 per cent of the dyes consumed in its plants in 1922 were manufactured in the United States, and that the average price paid for American dyes in that year was $1.09, which compared very favorably with the pre-war average price of 67 cents per pound.

In an Institutional Story advertisement, the largest domestic manufacturer of woolen goods, referring to American textile mills, states:

> They are employing American dyes that are as fast and as efficient as any foreign dyes ever were.

Relation of production to consumption.—Imports of dyes in 1922 were 3,982,631 pounds [3] and the invoice value was $5,243,257. Production in that year amounted to 64,632,187 pounds, valued at $38,779,312. Imports were, accordingly, 6.2 per cent of total production by quantity and 13.5 per cent by value. It should be noted, however, that in the comparison by value the cost to the consumer of imported dyes is greater than the invoice value, so that the true ratio of sales value of imports to value of production is greater than the estimate of 13.5 per cent given.

Exports of "color lakes, and other colors, dyes, and stains" during 1922 totaled 6,956,593 pounds, valued at $3,023,127. The domestic consumption of dyes is assumed to equal production plus imports minus exports, or 61,658,225 pounds for the year. In volume production was 104.8 per cent of domestic consumption. Imports constituted 6.5 per cent by quantity, and production about 93.5 per cent of apparent consumption. In 1914 imports were about 90 per cent of consumption.

The Ruhr occupation.—The occupation of the Ruhr by the French Army has been of great interest to the chemical world, owing to the

[3] This figure is in excess of the actual quantity imported, owing to the fact that most of the vat dyes have been reduced to a single strength basis.

that a large number of the chemical and dye factories of Germany located in the occupied section. The export restrictions of French and Germans, the conflict between the two authori- together with the hindrances to transportation and other ormal conditions, have resulted in a partial paralysis of the ort trade of Germany in both dyes and chemicals. Prior he war Germany dominated the world's dye and organic chemical kets. After the outbreak of the war the large dye-consuming ons, such as China, the United States, Great Britain, and France, ered an acute shortage of dyes, owing to the shutting off of the man supply. Subsequently the United States, Great Britain, and nce developed their own dye and organic chemical industries. occupation of the Ruhr was probably as little expected by the ile mills and dye and chemical consumers as was the war itself. tunately, however, for domestic dye consumers the dye industry he United States is able to supply more than 90 per cent of do- tic consumption. Regardless of the outcome of the Ruhr occu- on, this country is no longer completely dependent on Germany dyes and organic chemicals, as was the case prior to 1914, and sumers have no present reason to fear another dye famine.

Production of Dyes by Classes.

he dyes produced in the United States in 1922 are classified rding to method of application as follows: (1) Acid dyes, (2) c dyes, (3) direct dyes, (4) lake and spirit-soluble dyes, (5) mor- t or chrome dyes, (6) sulphur dyes, (7) vat dyes, subdivided into go and other vats, and (8) unclassified dyes. While in certain s the classification of a color is arbitrary, because a dye may have perties which permit of its application by more than one method, believed that the above classifications facilitate the comparison roduction and import figures.

he production of dyes in the United States from 1917 to 1922, usive, as compared with the imports during the fiscal year 1914 the calendar years 1920 and 1922, are arranged according to the es given above in Table 7.

ACID DYES.

scription.—The acid dyes are commonly applied in an acid bath; have acid properties and are usually sodium salts of a color acid. constitute the most important group used in wool dyeing, being cially adapted to the dyeing of hosiery and carpet yarns, suitings, goods, and hat materials; they have, in addition, considerable ication on silk. They are little used on cotton or linen because eir lack of affinity for vegetable fibers, but are of value in the ng of jute. In general, their use is largely confined to goods not iring repeated washings.

id dyes yield clear, bright shades. They are superior to the t and mordant dyes in purity of shade, but are not equal to dyes in this respect. They have a wide color range, and in ess they show great individual variation; as a rule they are fast to light and acids, and have a tendency to bleed in washing. yield faster shades on wool than on silk. Some of the more plex acid dyes produce shades of good general fastness. A con- able part of this group is of the lowest-priced dyes produced.

Their method of application in an acid bath is simple and of low labor cost.

The line of demarcation between acid dyes and certain colors of the direct and mordant groups is arbitrary. Certain acid dyes when "aftertreated" with sodium or potassium dichromate, yield shades of good fastness to milling, light, washing, and other agents. These dyes, known as acid chrome colors, are used chiefly on wool, especially on loose wool yarns and piece goods, such as men's suitings. Most of the acid dyes are chemically included in one of the following groups: (1) Nitro compounds, (2) azo compounds, (3) sulphonated basic dyes (mostly triphenylmethane derivatives).

Production.—Acid dyes rank fourth in order of quantity produced, totaling 9,880,014 pounds, or 15.29 per cent of all dyes manufactured. The production in 1921 was 7,843,009 pounds.

Three acid dyes exceeded a million pounds each in production. Of these, Agalma black 10B, with a total production of 1,645,373 pounds, ranked fifth in quantity of all dyes manufactured. Sales of this color amounted to 2,032,531 pounds, valued at $1,603,149; the price decreased from $1.09 per pound in 1921 to 79 cents in 1922. The output of Orange II was 1,341,971 pounds. Nigrosine (water soluble), with a total of 1,338,063 pounds, showed an increase of 100 per cent over 1921. Tartrazine, with a slight decrease in production from the previous year, totaled 551,480 pounds. Other important bulk acid dyes include Indigo extract, the output of which was 543,044 pounds; Azo rubine, 372,060 pounds; Metanil yellow, with a large increase to 290,502 pounds. The output of the diphenylnaphthylmethane color, Wool green S, which was produced for the first time in 1920, reached 256,461 pounds in 1922. Ponceau 2R, Fast red A, Bordeaux B, Brilliant croceine, Sulphoncyanine black, and Victoria violet recorded large increases in output in 1922 and an individual output of over 146,000 pounds.

Sulphoncyanine G again declined in production during 1922, the total amounting to 152,807 pounds. The maximum output of this color was 365,998 pounds in 1921. Other dyes which recorded decreases for 1922 include Patent blue A, Fast red VR, Fast acid violet 10B, and Guinea green.

No production was reported for Patent blue V. There was a deficiency also in certain of the acid alizarins, such as Alizarin rubinol. On the other hand, the production of Alizarin saphirol B showed a noteworthy increase to 180,284 pounds. Sales of this dye ranked fifth in value, totaling $789,365. The average price declined from $6.22 in 1921 to $4.08 per pound in 1922. Other notable increases were in the output of Fast light yellow, Xylene yellow, and Fast acid fuchsine. Among the new acid dyes reported in 1922 are Palatine black, Crumpsall yellow, Fast acid blue, and Phloxine.

Imports.—The imports of acid dyes during 1922 amounted to only 601,395 pounds, or 15 per cent of all dyes imported, compared with 1,455,823 pounds in 1921, when this class ranked first in quantity of dyes imported. The imports during the pre-war year 1914 amounted to 9,286,501 pounds. The six leading acid dyes in order of quantity imported in 1922 were: Fast green, 52,498 pounds; Patent blue, 49,136 pounds; Kiton fast yellow, 46,753 pounds; Alizarin rubinol, 26,457 pounds; Erioglaucine, 25,852 pounds; and Fast light yellow, 25,555 pounds.

BASIC DYES.

scription.—The basic dyes surpass all others in depth brilliancy ade, and purity of tone. They possess high tinctorial power, but class lack fastness, especially to light and washing.
sic colors are used on cotton in dyeing and printing, where t shades or color tints are desired without special requirements astness. They are also employed in the dyeing of paper and and for lithographic inks, typewriter ribbons, copy paper, and ils. With the exception of Rhodamine B and a few others they little application on wool. Dyes of this class are chemically in character and are fixed on vegetable fibers with an acid lant, namely, tannic acid.
ey are historically the oldest of the coal-tar dyes. Mauvine erkin violet, discovered by W. H. Perkin in 1856, was the first ne dyestuff produced on a commercial scale. Basic dyes are not nportant as formerly; for cotton dyeing they have been super- d by direct and sulphur dyes, which have advantages in economy pplication and in many cases possess better fastness. In wool ng the acid dyes have almost entirely displaced the basic colors. nically, the basic dyes include a large number of the triphenyl- hane derivatives, and, in addition, members of the following es: (1) Azines, (2) azos, (3) thioazines, (4) thioazols, and (5) dines.
roduction.—The 1922 output of basic dyes was 2,937,585 pounds, .54 per cent of the total, as compared with 1,853,094 pounds in . There was a general increase in the output of individual basic and accompanied by conspicuous price reductions in this group. h a few exceptions, the domestic manufacture of this class of dyes ell developed. Imports of 1922 were only 155,084 pounds, or 3.9 cent of the total compared with 3,002,480 pounds in 1914.
he leading basic dye produced in 1922 was Bismarck brown 2R, output of which was 658,060 pounds; the sales amounted to 247 pounds, valued at $442,394. Chrysoidine Y, with total pro- ion of 538,733 pounds, showed a gain of more than 100 per cent the previous year. Methylene blue, with an output of 372,077 nds, and Methyl violet, with a total of 350,564 pounds, both rded gains over the previous year. The production of Auramine firms was 344,827 pounds, the highest since its first production ng the war and an increase of 265 per cent over 1921. The e receded from $2.02 per pound in 1921 to $1.66 per pound in 1922. imports of Auramine in 1914, when the entire consumption was ined from abroad, totaled 449,276 pounds, receding to 35,532 nds in 1921 and to 12,599 pounds in 1922. The output of Safranine rd d a large gain to 138,590 pounds. The output of Rhodamine owed a marked increase. Conspicuous exceptions to the general ease in output of basic dyes were Rhodamine 6G and Phosphine. lines in the production of these two dyes were reflected in an ease of imports. The five leading basic dyes in quantity imported ng 1922 were Phosphine, 51,711 pounds; Rhodamine 6G, 13,545 nds; Auramine, 12,599 pounds; Thioflavine T, 6,765 pounds; Methylene green, 6,069 pounds.

DIRECT COTTON DYES.

Description.—The direct or substantive dyes have been introduced within the past 25 years. Their method of application is simple, as they dye vegetable fibers full shades in a neutral or alkaline bath, "directly," without the use of mordants. Although their principal application is on cotton, they are of special value in dyeing fabrics containing both cotton and wool (union goods) or silk and cotton. They are also used on linen, silk, and paper and to an increasing extent on wool, especially for knitting yarns, worsted and shoddy yarns, and loose wool.

In fastness, individual dyes of this group show a wide variation. On account of their high solubility they have a tendency to run when washed. Many direct dyes, particularly those first introduced, are sensitive to acids and fade on exposure to sunlight; others, especially the newer direct dyes, have good fastness to both acids and light as well as to other agents. Certain direct colors are of good fastness, particularly to washing, after a treatment of the dyed fiber by "coupling" with certain intermediates. An aftertreatment with metallic salts or formaldehyde also improves the fastness of certain direct dyes. These "developed" direct dyes were not available in the early part of the war; the ordinary direct dyes then used for hosiery caused much dissatisfaction on the part of the consumer. Developed blacks, such as Zambezi black V, are now manufactured in this country for hosiery.

With a few exceptions the direct dyes are chemically "azo" compounds and are nearly all derivatives of benzidine, tolidine, diamino stilbene, or a group closely approximating one of these. A small but valuable group of direct colors belongs in the thiazol class.

Production.—The direct cotton dyes ranked third in quantity produced in 1922 with a total of 11,931,737 pounds, or 18.46 per cent of all dyes manufactured. In 1921 the output of this group was 7,053,761 pounds, or 18 per cent of total production for that year. The imports of direct colors in 1922 were 671,621 pounds, or 16.86 per cent of all dyes imported. In 1914 the imports totaled 10,264,757 pounds.

Direct deep black EW, with a total of 5,326,457 pounds, ranked third of all dyes manufactured. Sales of this color amounted to 6,009,842 pounds, valued at $2,504,197, while the price showed a conspicuous decline from 79 cents in 1921 to 42 cents per pound in 1922. Oxamine black BHN, with an output of 700,015 pounds, showed a gain of 148 per cent over that of 1921. The price decreased from $1.48 per pound in 1921 to 91 cents per pound in 1922.

Benzamine brown 3 GO again ranked second in quantity of production, 695,602 pounds, compared with 491,347 pounds in 1921. The price of this color declined from $1.15 in 1921 to 73 cents per pound in 1922. Benzo blue 2B showed a slight gain in output to 593,487 pounds. The stilbene dye, Direct yellow R, recorded a gain of 144 per cent to 375,224 pounds, while Benzo purpurine 4B increased 100 per cent to 309,384 pounds. The total output of thiobenzenyl dyes, Primuline and Columbia yellow, was 252,450 and 230,204 pounds, respectively. Other important bulk direct dyes were Congo brown G, with a production of 234,963 pounds; Oxamine green B, 215,140 pounds; Erie direct black RX, with a decline to 181,308 pounds;

ysophenine G, 168,454 pounds; and Columbia black, with a very e increase to 161,718 pounds.

erhaps the most important development in this group of colors in 2 was the addition of a range of developed direct dyes which are of it value in producing shades of good fastness on cotton and silk. his class Zambesi black D, which presents great difficulties in its ıtification and manufacture, recorded a very large gain. This :k is consumed in large quantities by the hosiery industry. The nma acid, Chicago acid, and J acid derivatives showed conspicu- increases in production. Among the direct dyes which showed a ller tonnage in consumption and yet are of great value to the tile trade are Chicago blues, Diamine rose, Diamine scarlet, Benzo scarlets, Benzo fast pink, Diamine violet N, Diamine catechine, mine fast blue FFD, Rosanthrene AW, L, B, R, Rosanthrene nge, and Congo fast blue R. The six leading direct dyes in quan- of imports are: Trisulphon brown, 45,697 pounds; Trisulphon wn GG, 37,648 pounds; Toluylene orange, 36,920 pounds; Di- nyl red, 33,945 pounds; Diaminogene blue, 18,620 pounds; Chloran- fast violet, 18,188 pounds.

MORDANT AND CHROME DYES.

escription.—These colors, in conjunction with metallic mordants, as salts of chromium, aluminum, iron, and tin, dye both vege- e and animal fibers. The resulting shades are, in general, of ptional fastness to color-destroying agents. The mordant dyes d on wool the fastest shades to light, washing, and other agents. y are also important in textile printing, particularly on cotton e goods, but are little used on silk.

he mordant dyes are frequently designated as chrome colors. As ıy of these colors are derived from alizarin, they were formerly ed alizarin dyes. The true alizarins are generally used with a dant; some of the new alizarins, known as acid alizarins, can be d either with or without. In the application of chrome dyes on l, the mordant may be applied before, during, or after the dyeing ration. Certain dyes may be acid, acid chrome, or chrome, ording to the method of application. The labor cost of dyeing ı mordant and chrome dyes is higher than for other groups.

he most important dye of this class, alizarin, is used in the produc- of the well-known Turkey red on cotton. This is one of the les produced in ancient times from the madder root. Alizarin been prepared synthetically from anthracene for about 50 years. hemically, the mordant dyes are members of the following nical classes: (1) Anthracene, (2) azo, (3) oxazine, (4) triphenyl- hane, (5) nitroso, (6) oxyquinone, and (7) xanthone.

roduction.—The output of mordant and chrome colors in 1922 3,749,701 pounds, or 5.8 per cent of all dyes produced. This is ght decrease from 1921, when 3,997,442 pounds were produced. imports of this class in 1922 were 716,790 pounds, or 18 per of the total; in 1914, prior to the extensive development of the ıstry, they totaled 4,450,442 pounds. Although the increase in output of individual dyes and the production of new dyes reflect ıite progress in this branch of the industry during 1922, further elopment is desirable.

Salicine black U ranked first among the mordant and chrome dyes in quantity produced, totaling 1,165,939 pounds, with sales of 1,114,275 pounds valued at $612,008. The decrease from the 1921 figure may be attributed in part to the increased output of other wool blacks. The average price per pound decreased from 75 cents in 1921 to 55 cents in 1922.

The output of Eriochrome black T was 303,085 pounds, a very large increase over that of 1921. The imports totaled 132,388 pounds in 1921, but in 1922 receded to 13,977 pounds.

Production in large quantity of Eriochrome black A was reported for the first time in 1922. This dye was imported in larger quantities in 1921 than any other, totaling, 224,002 pounds as compared with 24,499 pounds in 1922. The production of Erichrome blue black B showed a large gain to 92,163 pounds. Alizarin yellow G ranked second among this class of dyes, with an output of 441,699 pounds, compared with 271,285 pounds for the previous year. This dye was consumed in large amounts for army uniforms during the war. Metachrome brown B held third place, with a total of 312,828 pounds.

Among the mordant and chrome dyes showing a large output are Alizarin yellow R, 198,362 pounds; Diamond black, 176,988 pounds; Gallocyanine, 82,253 pounds; Alizarin brown, Palatine chrome brown, Diamond flavine G, Palatine chrome red B, and Mordant yellow were also made in quantity.

Alizarin showed a conspicuous increase in output. The imports for 1922 were 27,086 pounds, compared with 136,283 pounds for the previous year. Important alizarin derivatives now produced in the United States are Alizarin GI, Alizarin SX, Alizarin orange, Alizarin red S.

Production was reported in 1922 for Prune pure, Fast mordant yellow, Milling orange G, Alizarin black, Anthracene chrome black, Chrome brown RR, Anthracene chromate brown EB, Anthracene chrome violet AA, Anthracene acid brown, and Alizarin blue black.

The eight leading mordant and chrome dyes in the order of quantity imported during 1922 are: Anthracene blue WR, 52,364 pounds; Alizarin saphirol B, 46,596 pounds; Erio chrome azurol BC 43,191 pounds; Alizarin blue S, 32,916 pounds; Gallamine blue, 29,237 pounds; Alizarin, 27,086 pounds; Alizarin viridine, 25,910 pounds; Alizarin red, 25,872 pounds.

SULPHUR DYES.

Description.—This group of dyes produce heavy, deep shades of blue, green, brown, and black. They are used almost entirely in cotton dyeing, being especially adapted to uniform cloths, hosiery, gingham yarns, and cotton warps to be woven with wool and later dyed with acid dyes. Their greatly extended use during the war served to increase permanently their application in cotton dyeing. Sulphur colors are also used in the dyeing of linen and artificial silk.

The sulphur dyes possess excellent fastness to washing, fulling, alkalies, and acids in cross dyeing. With some exceptions, their fastness to light is good. As they are not fast to chlorine, they do not withstand the repeated bleaching action of hypochlorites in the modern laundry treatment. They are applied in a sodium sulphide solution with after treatment in certain cases with metallic salts to

improve their fastness. The first dye discovered in this group, "Cachou de Laval," was made in 1867 by the fusion of sawdust with sodium sulphide and sulphur. Sulphur dyes are now prepared by the fusion of various intermediates (containing the nitro, amino, or imino groups) with sodium sulphide and sulphur. These dyes are not pure, distinct compounds, and the presence of other substances render them of comparatively low color value. Recent developments, however, have greatly increased the tinctorial value and range of shade of many of them.

Production.—Sulphur dyes ranked second in quantity of output with a total of 16,913,767 pounds, or 26.17 per cent of the total production in 1922. This group ranked first in output during the years 1917–1921. The manufacture of sulphur dyes received the early attention of dye manufacturers and is now well developed both in variety, quality, and quantity. The small amount of the imports during the last two years (totaling 194,883 pounds in 1922) indicates that the domestic sulphur dyes supply nearly all requirements.

Sulphur black constituted 20 per cent of the total production of all dyes in 1922, with an output of 12,877,649 pounds and sales of 13,401,540 pounds, valued at $2,869,933. This is a large increase over 1921, when the output was 7,832,696 pounds. The average price of sulphur black during 1922 was 21 cents per pound compared with 23 cents in 1921 and 60 cents in 1917. The output of sulphur browns was 1,778,780 pounds. The sulphur blues which include a variety of dyes showed a noteworthy increase from 190,621 pounds in 1921 to 865,091 pounds in 1922. Increases were also recorded in the output of Sulphur green, Olive, Tan, and Yellow, while the production of Sulphur maroon decreased slightly. New sulphur dyes reported include blues, greens, browns, orange, and yellows.

The five leading sulphur dyes imported during 1922 were Thionol brown, 48,750 pounds; Eclipse brown, 35,991 pounds; Cross-dye green, 27,834 pounds; Thionol yellow, 26,682 pounds; and Sulphur green, 24,872 pounds.

VAT DYES.

Description.—Vat dyes, on account of their exceptional fastness, variety, and beauty of shade, are of special importance for cotton goods where laundry-fast dyes are necessary. They are used on both dyed and printed shirtings, blouse material, dress goods, ginghams, muslin curtains, and other cotton wash goods. Because of their high cost, they have comparatively limited use for solid or heavy shades but are used for color stripes or for small printed patterns on a white background. They possess technical advantages in application over the alizarin mordant dyes. They are little used on wool, because they must be applied in an alkaline bath, a process that is injurious to wool.

The vat dyes as a class possess exceptional fastness to light, washing, acids, alkalies, and in most cases to chlorine. Certain vat dyes possess good fastness to only a part of these agents. No other class of dyes possesses an equal fastness to chlorine. The use of vat dyes is increasing, and they promise to be of greater importance in the cotton dyeing and printing industry as their comparatively high cost is reduced.

With the exception of indigo, which is one of the oldest dyes known, vat dyes are of recent origin. They are difficult to manufacture, of relatively high cost, and are among the most complex of dyes. Chemically, they are divided into indigoids (including thioindigoids), anthraquinone derivatives, and the carbazole derivatives. Separate dyes of these different classes were made in the United States during 1922, with the exception of the thioindigoids, which include scarlets and reds.

Production.—Classified by method of application the production in 1922 of vat dyes including indigo ranked first, totaling 16,926,744 pounds, or 26.19 per cent of total output.

Indigo.—The production of indigo alone for 1922 was 15,850,752 pounds, or 24.52 per cent of total production of dyes. This represents a large increase over 1921, when the output was 6,673,968 pounds, but it does not equal the output of 1920, when the maximum figure was 18,178,231 pounds. During that year, the United States exported large quantities of indigo to China. Sales of indigo in 1922 were 16,106,020 pounds, valued at $3,922,541. The average price was 24 cents per pound compared with 45 cents in 1921, and $1.45 per pound in 1917. Indigo has recently sold below 20 cents per pound, indicating sharp competition between domestic manufacturers of this product.

Vat dyes (not including indigo) show large increase.—The production of vat dyes (other than indigo) in 1922 was 1,075,992 pounds, an increase of 211.7 per cent over that of 1921. This large increase is probably the most important expansion in the dye industry during that year. The total quantity of this group of dyes is slightly below production in 1920, when the United States before the reappearance of German dyes had a large export trade in the world's markets. The output in 1920, however, represented only a few dyes; a very large percentage consisted of brom indigos for export to the Far East.

Indanthrene blue GCD, the most important vat dye other than indigo, led in quantity of production, with an increase of over 200 per cent over the previous year. The price declined 30 per cent. The production of Indanthrene yellow increased nearly 1,000 per cent; Indanthrene violet, over 500 per cent; Indanthrene green and black, nearly 400 per cent; and Indanthrene brown B, over 700 per cent. A large commercial production was reported for the first time of Ciba blue 2 B and 2 BD and the carbazole derivatives, Hydron blue R and G. Anthrene jade green, a vat dye of American development, showed a large increase over that of the previous year. The output of Indanthrene dark blue BO showed a decline from that of 1921. Small quantities compared with total consumption were reported for Indanthrene claret B, Blue R and Blue GG, and Gray B.

The story of Indanthrene blue BCS is of particular interest in tracing the development of the industry and its resourcefulness in meeting new conditions. In January, 1922, this new vat dye was imported. It is very similar to Indanthrene blue GCD in its general properties, but differs, however, in a somewhat greater fastness to chlorine. Within five months from the first commercial importation of this dye two manufacturers had completed research and plant trial work and were producing the dye on a commercial scale. It is under-

stood that the capacity of these two plants is equal to the domestic requirements. The production in 1922 made up a significant part of the vat blues. The imports of vat dyes (other than indigo) totaled 1,548,519 pounds (single strength), or 38.89 per cent of all dyes imported during that year.

During 1914, when the entire consumption of vat dyes was imported, the total import of this group was 1,945,304 pounds, or 4.2 per cent of all imports. Adding production in 1922 to the imports for that year, there is an indicated consumption of over two and one-half million pounds. Domestic production in 1922 was about 41 per cent of that total; consequently, to supply the total needs of the group there is a demand for a 150 per cent increase in output over that of 1922.

The vat dyes are among the most complex, and their manufacture presents great difficulty. As their consumption is about 5 per cent of total domestic dye requirements, they were among the last to be developed and produced in this country. As the diversity of this class is fairly great, the manufacture of complete domestic requirements does not promise any considerable profit, because many of the special types are consumed only in small quantities. For a well-rounded and independent dye industry, however, the production of this class is of importance, and it is to this class of dyes that the domestic industry should give special attention.

Consumers are slowly coming to recognize the fact that fast dyes are obtainable and that colored cotton goods, fast to light, washing, alkalies, acids, and severe laundry treatment, can be purchased. There is therefore an increased demand for fast colors on cotton goods. Furthermore the higher price of cotton makes the slight increase in cost per yard of goods, resulting from the use of more expensive but better colors, of relatively less importance. These conditions indicate that the consumption of vat colors will increase year by year and that the annual requirement will exceed 3,000,000 pounds within the next few years. The United States is to-day the largest consumer of vat dyes, and increased production in both variety and quantity is desirable.

The eight vat dyes which lead in quantity imported are: Indanthrene blue BCS (single strength), 239,085 pounds; Ciba blue 2B (single strength), 205,582 pounds; Ciba violet B (single strength), 131,661 pounds; Indanthrene golden orange R (single strength), 78,145 pounds; Indanthrene golden orange G (single strength), 73,305 pounds; Indanthrene violet B (single strength), 54,768 pounds; Helindone pink An and BN (single strength), 48,633 pounds; and Helindone pink BR (single strength), 40,668 pounds.

COLOR LAKE AND SPIRIT-SOLUBLE DYES.

Description.—These dyes constitute one of the smaller groups. The color lake dyes are used in the preparation of a class of pigments known as color lakes, discussed in detail under that heading.

The spirit-soluble dyes are insoluble in water, but dissolve in either oils, fats, or various organic solvents; hence they find application for coloring varnishes (both spirit and oil), fats, oils, waxes, and similar products. Many of the spirit-soluble dyes are con-

verted by chemical treatment, such as sulphonation, into water-soluble dyes for use in textile dyeing, and from this point of view may be considered partly completed dyes.

Production.—The production of lake and spirit-soluble dyes in 1922 was 1,009,512 pounds, constituting 1.56 per cent of the total output of dyes. The production of this group in 1921 amounted to 720,400 pounds. Imports during 1922 totaled 76,853 pounds, or 1.93 per cent of all dyes imported, compared with 43,553 pounds in 1921.

FOOD DYES.

Production.—Dyes, used for coloring food and food products, include a limited list of selected dyes which meet the specifications of the Bureau of Chemistry. The total production of these colors in 1921, the first year that they were separately compiled, was 50,709 pounds. The output in 1922 was 186,600 pounds and the sales were 181,812 pounds, valued at $695,254. The average value of sales during 1922 was $3.82, compared with $5.80 for 1921.

DYE EXPORTS FROM THE UNITED STATES.

1922 EXPORTS SHOW LARGE DECLINE.

The total exports of "color lakes and other colors, dyes, and stains" in 1922 were valued at $3,023,127, or less than one-half that of 1921, when the total exports of "aniline dyes and all other dyes" were valued at $6,270,139. The 1922 figure represents a decline of 90 per cent from 1920, when the total value was $29,823,591.

Prior to 1922 the Department of Commerce reported only the value of exports of domestic dyes and dyestuffs, which it classified under the following groups: (1) Aniline dyes, (2) logwood extracts, (3) all other dyes and dyestuffs. The third classification covers both coal-tar dyes and natural dyes, other than logwood extract. Since logwood extract is by far the most important natural dye exported from the United States it is reasonable to assume that a large part of the figures returned for all other dyes and dyestuffs represents coal-tar dyes. The most important natural dye included under Group 3 is derived from the bark of the black oak (Quercus velutina) in two forms, viz, quercitron and flavine. These were exported in considerable amounts during the war and in smaller amounts before the war. In 1922 the Department of Commerce adopted a new classification, grouping coal-tar dyes under (1) color lakes and (2) other colors, dyes, and stains. For the first time the quantity as well as the value of the exports was published. Table 9 shows by months the total exports of dyes from the United States. The countries to which dyes are exported are shown in detail in Part VI, Appendix.

The combined value of the exports of aniline dyes and all other dyes in 1919 was $15,728,499, compared with $29,823,591 for 1920. In 1921 this figure showed a sharp decline to $6,270,155, a decrease of 79 per cent, as compared with the exports of 1920.

Exports of "color lakes" in 1922 were 12,761 pounds, valued at $7,454, and the total of "other colors, dyes, and stains" was 6,943,832 pounds, with a value of $3,015,673, making a grand total of 6,956,593 pounds, valued at $3,023,127. This value is a 52 per cent decline from the total exports of aniline and other dyes in 1921.

e import figures of China, India, and Japan for 1920 and 1921 Part V), shows that Germany, Switzerland, France, and Great in exported dyes in large quantities to China and India, and German exports of dyes to Japan likewise increased during years.

1923 DYE EXPORTS SHOW INCREASE.

e total exports of "coal-tar colors, dyes, and stains," as reported e monthly summary of foreign commerce for the first four months 23, were 5,456,812 pounds, with a value of $1,787,063. This ased demand for American dyes by the Far East markets may tributed in part to the reduced exports of German dyes since ccupation of the Ruhr by the French in 1923. The Tariff Com- on in its previous reports on Dyes and Coal-tar Chemicals has l attention to the fallacy of measuring the competitive strength e domestic industry by the large exports of 1919 and 1920 as any was scarcely in the market during that period. The rapid ne in exports during 1921 and 1922 has justified the commission's ion.

TABLE 9.—*Domestic exports of dyes, by months, 1919–1922.*

Month.	1919			1920		
	Aniline dyes.	All other dyes.[1]	Total.	Aniline dyes.	All other dyes.[1]	Total.
	$1,405,017	$755,382	$2,160,399	$917,574	$372,468	$1,290,042
y	1,231,355	617,050	1,848,405	1,850,662	379,825	2,230,487
	492,291	278,591	770,882	2,648,615	850,695	3,499,310
	777,123	359,512	1,136,635	1,829,771	891,467	2,721,238
	585,970	239,744	825,714	2,180,606	817,713	2,998,319
	858,661	475,571	1,334,232	2,389,515	1,239,191	3,628,706
	574,274	267,425	841,699	1,770,780	947,411	2,718,191
	761,009	350,491	1,111,500	1,151,196	623,181	1,774,377
ber	785,497	557,005	1,342,502	2,114,915	551,113	2,666,028
	1,037,708	453,390	1,491,098	1,802,142	334,167	2,136,309
ber	887,710	300,041	1,187,751	2,006,534	211,465	2,217,999
er	1,327,456	350,226	1,677,682	1,788,170	154,415	1,942,585
otal	10,724,071	5,004,428	15,728,499	22,450,480	7,373,111	29,823,591

Month.	1921		
	Aniline dyes.	All other dyes.[1]	Total.
	$943,595	$349,114	$1,292,709
y	397,123	72,641	469,764
	574,969	95,322	670,291
	305,760	59,250	365,010
	278,331	91,753	370,084
	444,273	81,477	525,750
	310,357	65,626	375,983
ber	513,012	70,663	583,675
	322,477	70,228	392,705
ber	349,981	73,706	423,687
er	372,244	78,703	450,947
	254,878	94,656	349,534
otal	5,067,000	1,203,139	6,270,139

merce and Navigation lists under domestic exports of "dyes and dyestuffs"—"aniline dyes," d extract," and "all other dyes and dyestuffs." Under this latter designation may be included tural and coal-tar dyes. However, since logwood extract—shown separately—is the most im- natural dye exported from the United States, it may be assumed that a considerable portion of rts under "all other dyes and dyestuffs" are coal-tar dyes.

TABLE 9.—*Domestic exports of dyes, by months, 1919–1922*—Continued.

Month.	1922.[1]					
	Color lakes.		Other colors, dyes, and stains.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
January	5,059	$4,188	364,971	$325,048	370,030	$329,236
February	6,796	5,124	298,364	230,544	305,160	235,668
March	3,612	3,162	708,792	405,250	712,404	408,412
April	8,446	2,105	581,367	271,571	589,813	273,676
May	401	500	328,733	227,898	329,134	228,398
June	282	361	398,975	222,370	399,257	222,731
July	356	249	726,624	364,737	726,980	364,986
August	593	411	896,701	383,692	897,294	384,103
September	341	607	664,348	304,022	664,689	304,629
October	576	890	954,922	399,439	955,498	400,329
November	1,702	2,228	1,084,890	395,579	1,086,592	397,807
December	64	103	1,307,272	446,365	1,307,336	446,468
Total	12,761	7,454	6,943,832	3,015,673	6,956,593	3,023,127

[1] The new classification adopted in 1922 was "Color lakes" and "Other colors, dyes and stains."

OTHER FINISHED COAL-TAR PRODUCTS.

COLOR LAKES.

Description.—A color lake is an insoluble color pigment consisting of a precipitating agent, the coloring matter (a coal-tar dye), and a carrier (the base). The desired properties of a color lake are good coloring power, easy workability, brightness, and fastness to weather, light, alkali, and acids. The precipitating agents used for coal-tar colors include barium chloride, lead salts, aluminium hydroxide, and tannin or tannin-tartar emetic. Among the more important carriers are aluminium hydroxide, zinc white, lithopone, barytes, whiting, China clay, and certain native clays, and ochers. The principal requirements of a carrier are (1) ready reduction to a finely divided state and (2) absence of any deleterious effect on the shade of the finished lake. The coloring matter includes those coal-tar dyes known as acid dyes, basic dyes, and mordant dyes, as well as certain azo dyes which are produced directly on the carrier. An example is the preparation of Para red from the intermediates p-nitroaniline and b-naphthol. Another group of color lakes is made by the precipitation of a water-soluble acid dye with the aid of the mineral salt to form an insoluble product.

After precipitation the soluble lake is filtered, dried, and ground with or without oil; it is then ready for use as a pigment in paints, lithographic inks, artists' colors, wall paper, rubber products, and for similar coloring purposes.

Production.—The total production of color lakes in 1922 amounted to 10,578,664 pounds and the sales to 10,366,676 pounds, valued at $4,551,572, with an average value per pound of 44 cents. This is an increase over 1921 when the output was 6,152,187 pounds and when the sales amounted to 6,424,612 pounds, valued at $2,863,189, with an average value per pound of 45 cents.

PHOTOGRAPHIC CHEMICALS.

Coal-tar chemicals of this class, owing to their strong reducing properties, are used for developing photographic films, plates, and prints. They are popularly known as "developers," and are commonly sold under various trade names.

The total output of photographic chemicals in 1922 was 345,798 pounds, an increase over 1921, when 183,798 pounds were produced. The sales for 1922 were 347,647 pounds, valued at $483,209, with an average value per pound of $1.39. The quantity of output of each individual developer can not be published without disclosing the output of individual manufacturers. The developer produced in largest quantity was hydroquinol and metol (methyl p-aminophenol sulfate) was the second largest. The production of p-hydroxyphenylglycine increased considerably in 1922 over the previous year.

MEDICINALS.

Description.—From the standpoint of national welfare this class includes some of the most important derivatives of coal tar. Chemically, they include a variety of products used for a wide diversity of purposes. The development of medicinals constitutes one of the most creditable accomplishments of the coal-tar industry, as the highest technical skill is required in their manufacture.

The total production of medicinals in 1922 was 2,946,347 pounds; the sales were 3,092,915 pounds, valued at $4,233,433, or an average price of $1.37 per pound. The 1921 production was 1,545,917 pounds; the sales for the same year were 1,876,246 pounds, valued at $2,930,324.

Arsphenamine, known also as salvarsan and as "606," the hydrochloride of 3-diamino-4-dihydroxy-1-arsenobenzene, used for combating syphilis and other protozoan infections, is one of the most important medicinals of this group. Its production in 1922 by 7 manufacturers was 865 pounds; sales were 917 pounds, valued at $257,022, or $280.28 per pound, as compared with 694 pounds, valued at $406.11 per pound in 1921. The pre-war price of "606," when this country was depended upon Germany, was $3.50 per ampoule. The present price per ampoule is about $1 wholesale to the public and about 20 cents to the Government. Neoarsphenamine (3-diamino-4-dihydroxy-1-arsenobenzene methanol sulfoxylate) had a total production by 4 manufacturers of 2,904 pounds. The total sales were 2,229 pounds, valued at $1,032,725, or an average price per pound of $463.31. Production of silver arsphenamine, which was reported for the first time in the census of 1921, showed a decrease for 1922.

Aspirin (acetylsalicylic acid) led all coal-tar medicinals in quantity produced, with an output by 5 firms of 1,482,998 pounds, compared with 733,510 pounds in 1921. The sales in 1922 were 1,427,385 pounds, valued at $1,062,346. This shows a slight increase in the average price, from 73 cents in 1921 to 74.4 cents in 1922. Sodium salicylate, of which 467,264 pounds were produced by 6 firms, ranked second in quantity manufactured; the total sales were 423,834 pounds, valued at $140,308, or 31 cents per pound. Phenol sulphonates (calcium, sodium, zinc, etc.) with a large increase in production, ranked third in quantity of output with 300,993 pounds; the

sales were 336,456 pounds, valued at $94,436. Acetanilide, with a production of 222,517 pounds, ranked fifth. Other medicinals showing a relatively large production were acetphenetidine, chloramine T, and salol.

A number of medicinals were reported for the first time in 1922. Some of these are of great interest to the medical world. Among the more important are: Apothesine (hydrochloride of diethyl-aminopropyl cinnamate), a synthetic local anesthetic belonging to the procaine type of anesthetic, which differs from the cocaine type in that it is effective for injection but ineffective when applied to mucous membranes; butyn (p-amino-benzoyl-gamma di-normal butylamino propanol sulfate) a new product which is of value as a local anesthetic; sodium luminal, the sodium salt of phenylethyl barbituric acid, is of special value in the treatment of some forms of epilepsy. The lack of this product was a serious inconvenience during the first year of the war. Its commercial manufacture involves problems of technical interest to the chemist. Cinchophen and neocinchophen (ethyl-methyl-phenyl-quinolin-carboxylic acid) reported in 1922 but not in 1921, are of value in the treatment of gout and acute articular rheumatism, and the latter is said to relieve the pain of sciatica. Proflavine (3:6-diamino acridine sulfate), prepared from acridine, proved to be of value during the war as an antiseptic in the treatment of wounds.

FLAVORS AND PERFUME MATERIALS.

Description.—There is no sharp line of demarcation between these two classes of coal-tar chemicals as many of them are used as both flavors and perfumes; a separate classification is, therefore, in certain cases arbitrary. They serve as perfume materials for toilet articles, soaps, and similar products, and as flavors for food and food products.

Production.—The total production of flavors in 1922 was 1,215,668 pounds; the sales amounted to 1,278,857 pounds, valued at $1,260,588. In 1921 the production was 901,245 pounds.

Some of these products show a large increase in production, notably saccharin, which is used as a sugar substitute, and methyl salicylate, used largely as an artificial wintergreen flavor. The total production in 1922 of methyl salicylate was 854,763 pounds. Coumarin, used both as a soap perfume and in the preparation of flavoring extracts, also shows a large increase in production over the previous year, totaling 72,350 pounds.

A new flavoring material reported for the first time in 1922 was isobutyl coumarone.

The output of perfume materials in 1922 was 793,148 pounds. This was a very large increase over 1921, when 119,335 pounds were produced. Sales of these products totaled 778,696 pounds, valued at $643,436.

Diethyl phthalate again ranked first in quantity of production and value of sales. This product was used under a special formula as an ethyl alcohol denaturant. The restriction of the use for illegal purposes of alcohol so denatured will probably cause production for 1923 to show a large decrease in volume.

Other products of this group made in quantity are amyl salicylate, benzyl acetate, phenyl acetic acid, benzylidene acetone, and diphenyl oxide.

The production of such important synthetics as phenylethyl alcohol, phenylacetic aldehyde, and cinnamyl alcohol are still below the domestic demand, while others such as the artificial musks are not reported at all.

Among the products reported for the first time in 1922 are dimethyl resorcinol, methyl anisate, methyl-p-tolyl ketone, beta-naphthyl anthranilate, nonyl anthranilate, phenylethylphenyl acetate, and phenylvinyl ethylene methyl ketone.

SYNTHETIC PHENOLIC RESINS.

The manufacture of synthetic resins is distinctly an American development and has resulted only from the most careful research and engineering skill. These products were first made by the condensation of phenol with formaldehyde and ammonia and later with hexamethylenetetramine. In recent years para-coumarone, as well as cresol, has been used as a base. Synthetic resins are used as a substitute for amber in the manufacture of pipe stems, cigarette holders, and similar articles. There is also a large consumption for electric insulating materials and for varnishes and lacquers. In 1922 the total production was 5,944,133 pounds, as compared with 1,643,796 pounds for the previous year. The sales for 1922 totaled 6,415,931 pounds, valued at $4,315,196.

SYNTHETIC TANNING MATERIALS.

The synthetic tanning materials known as "syntans" are of quite recent development, having come into commercial use in Germany and England since 1912. They give considerable promise for use in the tanning of leather in conjunction with natural tanning extracts.

Synthetic tans are made by condensation of certain coal-tar derivatives, such as the sulphonated phenols, cresols, and naphthols, with formaldehyde in the presence of an acid. They are commonly used in conjunction with the natural tanning extracts. Their use is reported to result (1) in an economy of time required for tanning, (2) a satisfactory leather of light color, and (3) a reduction in the amount of natural extract required.

Four firms reported in 1922 a total production of 1,910,519 pounds, with sales amounting to 1,981,588 pounds, valued at $103,598, or an average value of 5.2 cents per pound.

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922.*

[The number in the first column identifies the dye according to the 1914 edition of the Schultz tables. The second column gives the common name of the product. The numbers in the third column refer to the numbered alphabetical list of manufacturers printed on page 117. An X signifies that the corresponding product was made by a manufacturer who did not consent to the publication of his identification number in connection therewith. Blanks in the fourth and fifth columns indicate that there were actual sales during 1922, but that the figures can not be published without revealing information in regard to the output of individual firms. The blank space in the seventh column indicates that there was actual production of the corresponding dyes in the United States during 1922, but that the figures can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the total.]

GROUP III.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	Total finished coal-tar products.		*Pounds.* 93,370,065	$57,067,326	$0.61	*Pounds.* 88,363,121
	NITROSO DYES.					
4	Naphthol green	4, 65				
	NITRO DYES.					
7	Naphthol yellow S	30, 55, 85, 92, 182	46,235	50,584	1.09	38,42
8	Pigment chlorine	188				
	STILBENE DYES.					
9	Direct yellow R	4, 6, 38, 70, 77, 127, 129, 143.	375,937	332,466	.88	275,28
10	Stilbene yellow	64, 70				
11	Chloramine orange G	4, 6, 70, 127, 129	93,374	122,863	1.32	102,92
	PYRAZOLONE DYES.					
19	Fast light yellow	64, 84, 127, 130, 147	53,345	142,992	2.68	61,08
22	Xylene yellow	38				
23	Tartrazine	25, 84, 89, 127, 147, 181, 182.	586,862	636,247	1.08	551,48
	AZO DYES.					
	MONOAZO DYES.					
31	Spirit yellow	6				
32	Butter yellow	6, 30, 44, 85, 129, 200, X.	29,264	27,192	.93	25,42
33	Chrysoidine Y	25, 30, 64, 84, 85, 127.	495,571	311,398	.63	538,72
34	Chrysoidine R	4, 12, 30, 64, 84, 85, 127.	141,085	88,531	.63	32,76
35	Sudan G	6, 30				
36	Sudan I	30, 44, 85, 127, 129, 200, X.	38,193	33,988	.89	31,18
37	Croceine orange	4, 38, 105, 127, 165	22,969	17,775	.77	
38	Orange G	23, 25, 30, 64, 127, 165, X.	131,869	76,580	.58	124,31
40	Chromotrope 2R	127, 129, 130				
41	Fast acid fuchsine B	6, 30, 34, 46, 127, 129, 136.	22,541	18,456	.82	19,90
42	Amino naphthol red G	4, 30, 34, 64, 77, 84, 127, 142.	117,250	97,250	.83	88,65
45	Brilliant lake red R	117				
48	Alizarin yellow G	4, 6, 25, 38, 46, 64, 84, 93, 127, 136, X, X, X,	513,800	258,533	.50	441,08
56	Paranitraniline red	166				
57	Chromotrope 2B	23				
58	Alizarin yellow R	4, 6, 23, 25, 38, 46, 64, 84, 93, 129, 130, 165, X, X, X.	172,572	105,758	.61	198,36
61	Victoria violet	4, 38, 64, 77, 127, 129, 142.	162,089	235,866	1.46	146,99
64	Lanafuchsine	165				
65	Azo coralline	77, 84, X	12,325	29,702	2.41	10,74
66	Amino naphthol red 6B	30, 64, 77, 84, 127, 129, 142.	125,878	82,758	.66	107,93
67	Chromotrope 6B	4, 127, 129			1.01	34,88
68	Spirit yellow R	6, 30, 44, 127, X	37,209	38,779	1.04	42,43
70	Brilliant orange O	165				
73	Helio fast red	166				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	AZO DYES—Continued.					
	MONOAZO DYES—contd.		*Pounds.*			*Pounds.*
76	Sudan II	6, 30, 44, 64, 85, 127	20,388	$21,479	$1.05	20,275
79	Xylidine orange 2R	30, 165				
82	Ponceau 2R	4, 25, 30, 38, 85, 127, 129, 165.	355,548	215,773	.61	236,010
88	Acid anthracene brown R.	64, 127				
89	Metachrome brown B	23, 25, 64, X	371,666	262,055	.71	312,828
94	Azo eosine C	6, 129				
102	Diamond flavine G	23, 64, 84, 130				21,953
105	Sudan brown	6				
106	Autol red RLP	30, 166				
107	Sulphamine brown A	165				
109	Palatine red A	165				
112	Bordeaux B	4, 6, 25, 30, 38, 84, 105, 127, 165.	202,703	152,299	.75	167,142
114	Chromotrope 10B	6, 129				
117	Erica 2GN	70, 143				
119	Diamine rose	19, 70, 127, 143	34,092	102,449	3.01	32,897
132	Lake red P	165				
134	Metanil yellow	38, 64, 65, 84, 85, 127	315,047	291,078	.92	290,502
137	Acid yellow G	4, 64, 65, 127	6,284	6,465	1.03	7,315
139	Orange IV	182				
141	Azo yellow	30, 64, 65, 84, 127, 182, X.	142,895	186,107	1.30	109,699
143	Tropaeoline	4, 85				
144	Orange I	6, 30				
145	Orange II	4, 6, 25, 30, 38, 44, 64, 85, 127, 165.	1,440,055	545,018	.38	1,341,971
151	Orange R	6, 64, 85, 127	53,487	23,744	.44	
152	Permanent red 4B	38				
153	Lake red C	117, 165, 168	79,119	116,977	1.48	80,412
154	Palatine chrome brown	23, 46, 105, 127, 130, X	49,204	65,828	1.34	44,109
155	Acid alizarin garnet R	23, 65, 127				
156	Palatine chrome violet	23, 64, 65, 127	6,677	7,955	1.19	7,232
157	Diamond black PV	84, 127				
158	Chrome brown RR	46				
160	Fast brown N	84				
161	Fast red A	4, 6, 23, 25, 30, 38, 64, 85, 105, 127, 136, 165, X, X.	236,239	195,169	.83	189,389
163	Azo rubine	4, 6, 30, 38, 64, 84, 105, 127, 129, 130, X, X.	363,427	333,048	.92	372,060
164	Fast red VR	4, 127, 129, 130	117,273	176,192	1.50	57,572
166	Fast red E	4				
167	Croceine scarlet 3 BX	38				
168	Amaranth	6, 30, 38, 64, 105, 127, 129, 165.	53,603	45,924	.86	
169	Cochineal red	25, 30, 38, 64, 105, 127, 165.	134,061	101,294	.76	97,196
173	Lithol red R	26, 38, 66, 148, 165, 188	195,071	243,388	1.25	228,692
177	Mordant yellow	4, 6, 38, 127	57,347	43,615	.76	20,785
178	Crumpsall yellow	127				
180	Erio chrome blue black B.	23, 38, 84, 127, 130			.94	92,163
181	Salicine black U	4, 23, 30, 38, 64, 84, 105, 127, 129, 130, 165, X.	1,114,275	612,008	.55	1,165,939
183	Erio chrome black T	23, 38, 64, 130	290,247	269,835	.93	303,085
184	Erio chrome black A	23, 38, 64				
186	Lanacyl violet B	64				
188	Sulphon acid blue R	4, 64, 84, 127, 130	250,626	227,344	.91	60,163
189	Sulphon acid blue B	127				
190	Alkali brown	143				
193	Stanley red	143				
194	Thiazine red R	38, 70, 129	4,724	7,927	1.68	2,978
195	Rosophenine SG	70, 143, X, X	11,227	17,767	1.58	11,171
197	Thiazine red G	84, 143				
198	Mimosa C	19, 70, 77, 129, 143	1,744	2,943	1.69	2,812
200	Lake red D	188				
202	Palatine chrome red B	6, 30, 38, 64, 115, 127, 129, 130, 165, 188, X.	49,800	58,726	1.18	44,550
	Total monoazo dyes		8,433,593	6,279,470	.74	7,578,570

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1918*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	AZO DYES—Continued.					
	DISAZO DYES.		*Pounds.*			*Pounds.*
208	Leather brown	165				
211	Resorcin brown	4, 6, 64, 84, 85, 127, 136, X.			$0.89	117,732
213	Fast brown	4, 6, 30, 64, 127			1.29	28,673
217	Agalma black 10B	4, 6, 23, 30, 38, 46, 64, 84, 105, 127, 129, 136, 142, 165, X.	2,032,331	$1,603,149	.79	1,645,373
220	Palatine black	38				
221	Anthracene acid brown	64				
223	Sudan III	30				
227	Brilliant croceine	4, 30, 64, 127, 165	144,021	157,538	1.09	191,859
228	Ponceau 5R	30				
230	Cloth red 3G	64				
232	Sudan IV	6, 30, 38, 44, 127, 129, X.	22,051	26,744	1.21	20,453
233	Cloth red B	4, 6				
234	Cloth red G	38, 130				
236	Wool red B	12, 38, 127, 130, X	53,268	54,477	1.02	51,238
241	Neutral gray G	129				
246	Cloth scarlet G	65, 85				
247	Scarlet EC	6, 65, 127	40,953	48,364	1.18	34,158
250	Milling orange G	130				
257	Sulphocyanine G	4, 64, 77, 84, 127, 130	394,906	478,473	1.21	182,867
261	Buffalo black 10B	4, 127, 130	17,336	19,173	1.11	
265	Sulphocyanine black	64, 84, 127, 130				149,533
266	Naphthylamine black D	64, 84, 129, X	31,128	20,631	.66	43,010
272	Naphthol black B	126				
275	Diamond black	52, 64, 105, 127, 130	200,586	189,259	.94	176,988
276	Diamond green	64				
279	Benzo fast scarlet	64, 127				
283	Bismarck brown	6, 12, 30, 44, 52, 64, 70, 84, 85, 127, X.	181,025	119,147	.66	185,771
284	Bismarck brown 2R	4, 6, 12, 30, 38, 52, 64, 65, 84, 85, 127.	702,247	442,394	.63	658,060
288	Palatine chrome black	130				
289	Acid alizarin black SN	46				
294	Fast mordant yellow	4				
296	Benzo fast yellow	64				
297	Benzo fast pink 2 BL	64				
303	Paper yellow	6, 64, 127, 129	34,851	53,307	1.53	23,619
304	Chrysophenine G	6, 64, 70, 127, 129	229,594	389,913	1.70	198,454
307	Congo red	6, 64, 84, 127, 129, 136, X.	493,031	318,983	.65	
311	Orange TA	127				
312	Congo corinth G	4, 6, 30, 52, 84, 127, 129.	144,354	179,649	1.24	122,224
319	Diamine scarlet	64, 127				
320	Bordeaux	4, 38				
322	Trisulphon violet B	127, 129, 130	35,770	42,520	1.19	
323	Dianil blue R	143				
327	Diamine violet N	6, 23, 30, 38, 64, 105, 127, 129, 136.	48,452	69,544	1.44	27,393
328	Diamine black R O	6, 136				
333	Oxamine black BHN	4, 6, 23, 30, 38, 64, 105, 127, 129, 136, 143, X.	705,995	643,342	.91	700,015
336	Benzo cyanine R	127				
337	Benzo blue 2B	4, 6, 23, 30, 38, 46, 64, 127, 129, 130, 136, X.	777,491	375,778	.48	593,487
340	Benzo orange R	38, 64, 84, 129	70,506	62,922	.89	73,411
341	Crumpsall direct fast red	X				
342	Chrysamine G	6, 38, 46, 64, 127, X	7,594	7,062	.93	12,213
343	Diamine fast red F	6, 23, 30, 38, 64, 70, 105, 127, 129, 136, X.	86,013	119,350	1.39	78,050
344	Diamine brown	4, 6, 23, 30, 38, 64, 70, 105, 127, 129, 136, X.	164,914	181,355	1.10	123,975
351	Creosotine yellow	52, 127				
355	Anthracene red	129				
362	Oxydiamine orange	127				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	AZO DYES—Continued.					
	DISAZO DYES—contd.		*Pounds.*			*Pounds.*
363	Benzopurpurine 4B	4, 6, 12, 30, 38, 64, 105, 127, 129, X.	362,206	$327,550	$0.90	309,384
365	Benzopurpurine B	52				
377	Azo blue	44				
378	Trisulphon blue R	44, 129				
382	Azo mauve B	127				
385	Oxamine blue 4R	127				
386	Benzo blue BX	38, 127, 129	50,463	47,877	.95	38,126
391	Benzo blue 3B	12, 30, 38, 105, 127, 129	86,700	67,461	.78	24,343
392	Toluylene orange G	127, 129				
393	Diphenyl brown 3 GN	44				
400	Acid anthracene red	X				
403	Diamine black BO	6				
405	Benzopurpurine 10B	64, 127, 129	20,893	34,303	1.64	
407	Azo violet BS, 2B	4				
410	Benzazurine G	6, 64, 127, 129	51,718	66,145	1.28	
415	Dianil blue G	129				
419	Chicago blue RW	6, 64, 127, 129	52,598	76,142	1.45	53,637
421	Oxamine blue B	127				
424	Chicago blue 6B	6, 64, 127, 129	133,525	202,394	1.52	118,178
426	Benzamine pure blue	4, 6, 64, 127, 129	215,225	263,040	1.22	125,521
	Total disazo dyes		8,295,424	7,606,538	.92	6,881,592
	TRISAZO DYES.					
436	Columbia black	6, 38, 46, 64, 127	130,719	146,850	1.12	161,718
441	Diazo blue black RS	127				
451	Congo fast blue R	64				
456	Benzo fast blue	64				
462	Direct deep black EW	4, 6, 38, 46, 52, 64, 127, 129, 136, X.	6,009,842	2,504,197	.42	5,326,457
463	Erie direct black RX	6, 38, 52, 64, 127, 129	180,173	110,547	.61	181,308
464	Erie direct green ET	6, 46, 127	66,797	64,748	.97	57,066
470	Chloramine green B	129				
473	Diamine black HW	143				
474	Oxamine green B	4, 6, 30, 38, 64, 70, 127, 129.	231,749	213,836	.92	215,140
475	Oxamine green G	12, 38, 64, 129, X, X	59,236	57,824	.98	53,235
476	Benzamine brown 3 GO	6, 30, 38, 70, 84, 127, 130, 136, X.	733,214	535,986	.73	695,602
477	Congo brown G	4, 6, 64, 84, 127, 129, 143, X.	271,421	237,524	.88	234,963
480	Congo brown R	64				
	TETRAKISAZO DYES.					
485	Benzo brown G	12, 30, 52, 64, 70, 136	103,850	96,274	.93	129,436
487	Benzo brown B	70, X				
	All other azo dyes		818,576	941,503	1.15	875,695
	Total azo dyes		25,388,717	18,857,233	.74	22,448,895
	DIPHENYLMETHANE DYES.					
493	Auramine	23, 44, 64, 74, 104	339,532	562,040	1.66	344,827
	TRIPHENYLMETHANE DYES.					
495	Malachite green	64, 104, 127	172,735	210,585	1.22	
498	Turquoise blue	77				
499	Brilliant green	104, 127				
502	Guinea green	34, 64, 127	67,830	119,952	1.77	
503	Brilliant milling green B	34, 127				
505	Light green	64, 127				
506	Erioglaucine	127				
511	Para-fuschine	127				
512	Magenta (or Fuchsine)	38, 61, 64, 85, 95, 127, 153, 185.	96,786	218,894	2.26	84,683
513	New fuchsine O	127				
515	Methyl violet	38, 61, 64, 85, 90, 127, 132, 185.	370,878	476,793	1.29	350,564

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	TRIPHENYLMETHANE DYES—continued.		*Pounds.*			*Pounds.*
516	Crystal violet	23, 64				
517	Methyl violet 5B	127				
521	Aniline blue	38, 64, 85, 95	131	$597	$4.56	
524	Acid magenta	38, 95				
528	Fast acid violet 10B	34, 64				
530	Acid violet	34, 64, 77, 127, 142, X.	129,278	239,872	1.86	125,20
531	Eriocyanine	127				
536	Alkali blue	38, 61, 85, 95, 127, 132, 153, 165, 185.	104,187	252,621	2.42	94,62
537	Methyl blue for silk	85				
538	Methyl blue for cotton	95				
539	Soluble blue	38, 61, 95, 127, 165	21,914	75,209	3.43	21,02
543	Patent blue V	127				
545	Patent blue A	34, 127				
548	Acid violet 6BN	64				
558	Victoria blue R	64				
	Total triphenylmethane dyes.		1,206,831	2,204,545	1.83	898,70
	DIPHENYL-NAPHTHYLMETHANE DYES.					
559	Victoria blue B	23, 64				
562	Fast acid blue	64				
565	Acid blue B	34				
566	Wool green S	23, 64, 77, 84, 127, 142, X.	287,017	315,337	1.10	255,61
	XANTHONE DYES.					
571	Rhodamine 6G	64				
573	Rhodamine B	64				
580	Fast acid violet B	64				
582	Fast acid violet A 2R	64				
585	Uranine	55, 64, 85				
587	Eosine	55, 64, 85, 132	74,915	142,133	1.90	74,60
589	Eosine SP	64				
592	Erythrosine B	55, 64, 85, 132	4,674	25,638	5.49	6,71
593	Phloxine P	64				
595	Rose bengale	64				
596	Phloxine	85				
597	Rose bengale B	85				
599	Gallein	205				
600	Coerulein	205				
	ACRIDINE DYES.					
606	Phosphine	64, 85, 127				4,22
	QUINOLINE DYES.					
613	Quinoline yellow	127				
	THIOBENZENYL DYES.					
615	Thioflavine S	143				
616	Primuline	19, 77, 127, 129, 143, X.	243,416	259,912	1.07	252,43
617	Columbia yellow	19, 70, 77, 127, 129, 143.	184,357	237,122	1.29	230,24
	OXAZINE AND THIAZINE DYES.					
622	Delphine blue B	6, 46, 127, 130	19,408	38,021	1.96	
626	Gallocyanine	4, 6, 25, 46, 127, 205	119,357	229,296	1.92	82,33
631	Chromocyanine V	127				
636	Prune noire	6				
649	Cotton blue or Meldola's blue.	6, 46, 105, 127	28,663	59,146	2.06	28,29
659	Methylene blue	25, 30, 46, 127, 201	382,869	536,969	1.40	372,07
660	Methylene green	127				
667	Brilliant alizarin blue	77, 84				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	AZINE DYES.		*Pounds.*			*Pounds.*
672	Azo carmine	64				
679	Safranine	64, 127, 151	113,629	$192,473	$1.69	138,590
680	Methylene violet	90				
681	New fast gray	25, 44, 129	24,700	37,837	1.53	27,414
683	Safranine MN	127				
687	Rosolane O	64				
697	Induline (spirit soluble)	19, 30, 38, 44, 85, 127	32,164	30,367	.94	45,045
698	Nigrosine (spirit soluble)	19, 25, 30, 44, 84, 85, 127, 130.	290,423	157,459	.54	349,325
699	Induline (water soluble)	19, 38, 84, 85, 127	123,561	101,548	.82	121,009
700	Nigrosine (water soluble)	19, 25, 84, 85, 127, 130.	1,445,432	761,124	.53	1,338,063
	SULPHUR DYES.					
720	Sulphur black	12, 44, 46, 64, 84, 88, 105, 127, 201.	13,401,540	2,809,933	.21	12,877,649
	Sulphur blue	12, 18, 46, 54, 64, 84, 90, 105, 127, 129, 185, X	938,221	562,098	.60	865,091
	Sulphur brown	6, 12, 38, 44, 46, 47, 55, 64, 83, 84, 90, 105, 127, 163, 171, 186, 203.	1,678,320	673,256	.40	1,778,780
	Sulphur green	4, 44, 46, 47, 64, 84, 90, 105, 127, 129, 163, 203.	130,919	116,022	.89	169,769
	Sulphur maroon	12, 46, 64, 84, 105, 203.	259,975	205,388	.79	210,222
	Sulphur olive	46, 47, 84, 105, 163, 171, 203.	154,844	58,849	.38	115,702
	Sulphur orange	46, 84, 203	80,961	45,975	.57	109,642
	Sulphur tan	4, 38, 47, 84, 163, 203.	261,054	146,718	.56	242,835
	Sulphur yellow	12, 44, 46, 64, 127, 163, 203.	443,901	348,436	.78	544,077
	Total sulphur dyes		17,349,735	5,026,675	.29	16,913,767
	CARBAZOLE DYES.					
748	Hydron blue R, G	105				
	ANTHRAQUINONE DYES.					
763	Indanthrene dark blue BO.	9, 64, 129	29,731	48,911	1.65	
765	Indanthrene black and green B.	64, 129				
767	Indanthrene violet RR	64				
778	Alizarin	18, 127				
779	Alizarin orange	18, 127				
780	Alizarin red S	18, 64				
782	Alizarin brown	46, 64, 182, 188, 205	58,842	109,678	1.86	67,609
784	Alizarin SX	127				
785	Alizarin GI	18				
789	Anthracene blue WR	18, 100, 127, X				8,825
814	Algol yellow WG	9				
817	Algol yellow R	9				
819	Algol red R	9				
828	Indanthrene claret B	9				
838	Indanthrene blue RS	64, 129				
842	Indanthrene blue GCD	64, 129				
843	Indanthrene blue GC	129				
848	Indanthrene gray B	9				
849	Indanthrene yellow	64, 129				
858	Alizarin saphirol B	84, 100, 127, 129	193,401	789,365	4.08	180,284
862	Alizarin blue black	34				
865	Alizarin cyanine green	34				
867	Indanthrene brown B	129				
	All other anthraquinone dyes.		49,843	111,983	2.26	65,719
	Total anthraquinone dyes.		1,207,324	2,654,527	2.20	1,234,963

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	INDIGO AND ITS DERIVATIVES.		*Pounds.*			*Pounds.*
874	Indigo, synthetic, 20 per cent paste.	63, 64, 127	16,106,020	$3,922,541	$0.24	15,850,722
876	Indigo, white	46				
877	Indigo extract	14, 64, 110, 127, 185	608,105	265,344	.44	583,000
881	Ciba blue 2B, 2BD	63				
879 880 883	Brom indigos	63				
	ANILINE BLACK GROUP.					
923	Ursol	79, 165, 185				
	FOOD DYES.					
7	Naphthol yellow S	X				
23	Tartrazine	6, 25, 127, 195, X	49,907	173,412	3.47	50,000
32	Butter yellow	127				
83	Ponceau 3R	127, X				
144	Orange I	25, 127, X				
168	Amaranth	6, 25, 127, 195, X	66,558	218,467	3.28	77,000
502	Guinea green	127, 195				
505	Light green SF (yellowish)	127, 195				
515	Methyl violet	127				
592	Erythrosine	6, 25, 66, X				
677	Indigo disulfonic acid	25, 127, X	4,639	39,305	8.47	
	Yellow AB	6, 66, 85, 173	2,190	5,819	2.66	2,773
	Yellow OB	6, 66, 85, 173	1,951	5,228	2.68	4,270
	PHOTO CHEMICAL DYES.					
	Orthochrome T	68				
	Pinacyanole	68				
	All other dyes		1,271,307	1,595,179	1.25	998,830
	Bacteriological stains, biological stains and indicators.	68, 82, 96, 108, 127, 150, 177, X.	2,895	39,123	13.51	6,700
	Total dyes		69,107,105	41,463,790	.60	64,632,197
	Research chemicals	68, 82, 108, 177	650	12,434	19.14	1,667
	COLOR LAKES.					
	Black lakes	4, 35, 46, 86, 165, 200, X.	529,279	54,426	.10	541,784
	Blue lakes	11, 14, 21, 26, 35, 59, 64, 67, 71, 86, 97, 106, 109, 115, 160, 165, 166, 167, 168, 175, 188, 200, X, X, X, X, X, X, X.	811,022	359,975	.44	840,194
	Brown lakes	35, 59, 64, 71, 86, 97, 165, 166, 167, 187, X.	193,294	18,958	.10	198,000
	Eosine lakes	11, 21, 26, 59, 67, 71, 86, 97, 103, 109, 115, 160, 165, 166, 167, 168, 175, 187, X, X, X, X, X, X, X, X, X, X.	482,686	364,906	.76	482,000
	Green lakes	11, 21, 35, 59, 64, 67, 81, 86, 97, 106, 109, 115, 160, 165, 166, 167, 168, 175, 187, X, X, X, X, X, X, X, X.	408,764	131,070	.32	420,000
	Lithol red lakes	4, 11, 21, 26, 59, 64, 71, 86, 97, 103, 109, 115, 160, 165, 166, 167, 175, 188, 200, X, X, X, X, X, X, X.	524,314	390,248	.74	538,710

E 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
		Quantity.	Value.	Average price per pound.	
COLOR LAKES—contd.		*Pounds.*			*Pounds*
Maroon lakes	11, 21, 35, 59, 64, 67, 86, 97, 103, 112, 113, 115, 165, 166, 167, 175, 188, 196, 200, X, X, X, X, X, X.	813,121	$285,651	$0.35	822,105
Orange lakes	11, 21, 26, 35, 59, 64, 67, 71, 86, 97, 106, 109, 115, 132, 160, 165, 166, 167, 168, 175, 187, 188, X, X, X, X, X, X, X, X, X.	584,000	165,576	.28	628,813
Para red lakes	11, 21, 26, 46, 50, 59, 64, 67, 86, 97, 103, 109, 112, 113, 115, 165, 166, 175, 187, 188, 196, 200, X, X, X, X, X, X, X, X.	2,425,634	781,020	.32	2,388,976
Red Lakes	11, 21, 26, 35, 46, 50, 59, 64, 67, 71, 86, 97, 103, 106, 109, 112, 113, 115, 160, 165, 166, 167, 168, 175, 187, 188, X, X, X, X, X, X, X, X, X.	1,648,624	994,216	.60	1,651,649
Scarlet lakes	11, 21, 26, 59, 64, 67, 71, 86, 97, 103, 109, 113, 115, 160, 165, 166, 167, 168, 175, 188, 196, 200, X, X, X, X, X, X, X, X, X.	733,360	292,127	.40	783,001
Violet lakes	11, 14, 21, 26, 35, 46, 59, 64, 67, 71, 86, 97, 106, 109, 115, 132, 160, 165, 166, 167, 168, 175, 187, 188, 200, X, X, X, X, X, X, X, X, X.	458,467	448,955	.98	471,689
Yellow lakes	11, 35, 46, 59, 64, 71, 81, 86, 97, 106, 115, 165, 166, 167, 168, 175, 188, 200, X, X, X, X, X, X, X.	700,499	237,715	.34	734,870
All other lakes	X	53,612	26,639	.50	53,612
Total color lakes		10,366,676	4,551,572	.44	10,578,664
PHOTOGRAPHIC CHEMICALS.					
Diaminophenol hydrochloride.	198				
Hydroquinol	7, 120, 205, X	247,966	234,983	.95	244,580
Methyl p-aminophenol sulfate (Metol).	7, 68, X				
p-Hydroxyphenylglycine.	68				
Total photographic chemicals.		347,647	483,269	1.39	345,798
MEDICINALS.					
Acetanilide	118, 120, 124, 133	413,207	111,321	.27	222,517
Acetphenetidin	X				
Acridavine (3:6 diamino-10-methylacridine chloride).	1, 127, 190				422

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1921*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	MEDICINALS—continued.		*Pounds.*			*Pounds.*
	Acriflavine, neutral	127				
	Ammonium benzoate	164				
	Ammonium salicylate	X				
	Apothesine (hydrochloride of diethylaminopropyl-cinnamate).	X				
	Arsphenamine	1, 58, 60, 116, 122, 149, 172.	917	$257,022	$280.28	92
	Aspirin (Acetylsalicylic acid).	17, 63, 120, 124, X	1,427,385	1,062,346	.74	1,42[illegible]
	Benzocaine or Anesthesine (ethyl p-amino benzoate).	1, 122, 164	1,744	23,391	13.41	1,[illegible]
	Benzyl benzoate	72, 101, 120, 164, 190	15,945	20,299	1.27	12,[illegible]
	Benzyl succinate	164, X				
	Bismuth betanaphthol	120, 133, 149	1,034	2,895	2.80	
	Bismuth tribromophenol.	120, 133				
	Brilliant green, medicinal.	127				
	Butyn (p-amino benzoyl-gamma di normal butyl amino propanol sulfate).	1				
	Chloramine T (Sodium p-toluene sulfochloramide).	172, X				
	Cincophen (phenyl cinchoninic acid).	1, 25				
	Creosote	64				
	Creosote carbonate	25, 64, 138, 147	14,423	21,120	1.46	
	Dibromohydroxy mercury fluorescein sodium salt of.	96				
	Dichloramine T (p-toluene sulfone dichloramide).	124, 172				
	Ethyl-p-amino benzoate	122				
	Formidine (methylene disalicylic acid derivative).	X				
	Guaiacol benzoate	164				
	Guaiacol carbonate	64				
	Guaiacol crystals	129				
	Guaiacol liquid	64, 118, 129, 138	10,871	24,533	2.26	10,[illegible]
	Haloone (p-sulphone dichloroamido benzoic acid).	124				
	Lithium benzoate	118, 164, X				
	Luminal sodium (phenylethylmalonylurea sodium salt).	17				
	Magnesium salicylate	X				
	Mercuric benzoate	164				
	Methyl salicylate (see Flavors).					
	Methyl violet	127				
	Methylhydroxymethyl-ester of salicylic acid.	17				
	Monoglycol ester of salicylic acid.	17				
	b-Naphthol benzoate	25, 72				
	Neoarsphenamine	1, 58, 122, 149	2,229	1,032,725	463.31	2,[illegible]
	Neocinchophen	1				
	Novaspirin (methylene-citryl-salicylic acid).	17				
	Para fuchsine, medicinal	127				
	Phanacaine (ethenyl-p-diethoxy-diphenyl amidine hydrochloride).	122				
	Phenolphthalein	146, X				
	Phenolsulphonates (calcium, sodium, zinc, etc.).	1, 25, 114, 120, 149	336,456	94,435	.28	200,[illegible]

E 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
		Quantity.	Value.	Average price per pound.	
MEDICINALS—continued.		*Pounds.*			*Pounds.*
Phenylethylmalonylurea.	17				
Phenylthiocarbamide	31				
Phloroglucinol	53				
Procaine (p-amino benzoyldiethyl - aminoethanol).	1, 122, 172				
Proflavine (3:6 diamino acridine sulphate.	1, 127				
Proposote (creosote derivative).	X				
Pyoktanine blue, medicinal.	127				
Pyoktanine yellow	127				
Resorcinol monoacetate	68				
Sal-ethyl (ethyl salicylate).	X				
Salicaine (Salicyl alcohol).	25				
Salicylates, miscellaneous.	149				
Salol (phenyl salicylate)	120, 124, X	57,025	$35,893	$0.63	
Salophen (Salicylic-acid-acetyl-paraminophenol-salicylate).	17				
Scarlet red (extra) medicinal.	127				
Silver arsphenamine	122				
Sodium salicylate	63, 120, 124, 149, X, X	423,834	140,308	.31	467,264
Strontium salicylate	X				
Tolysin (p-methyl-phenyl-cinchoninic acid ethyl ester).	25				
Tribromophenol	63				
Trypan blue, medicinal	127				
All other medicinals	17				
Total medicinals		3,092,915	4,233,443	1.37	2,946,347
FLAVORS.					
Coumarin (synthetic)	118, X, X, X	83,444	253,220	3.03	72,350
Ethyl benzoate	72, 75, 137, 164, 176, 189, 192, X, X	4,640	7,631	1.64	4,370
Ethyl cinnamate	72, 76, 101, 176, 192, X	1,455	5,893	4.05	1,364
Ethyl salicylate	72, 76, 176, 189, 192	512	2,514	4.91	619
Iso-butyl coumarone	192				
Methyl cinnamate	72, 76, 101, 176, X	2,308	9,591	4.16	2,332
Methyl salicylate	63, 76, 120, 176, X, X, X	882,311	295,482	.33	854,763
Saccharin	29, 164, X, X, X				
Vanillin	X				
Total flavors		1,278,857	1,260,588	.99	1,215,668
PERFUME MATERIALS.					
Acetophenone	72, 101, 176, 190	194	696	3.59	194
Amyl phenyl acetate	176				
Amyl salicylate	72, 76, 125, 176, 190, X, X	7,995	7,494	.94	11,010
Aubepine (Anisic aldehyde).	72, 76, 101, 176, 190	840	2,157	2.57	805
Benzophenone	72				
Benzyl acetate	72, 76, 101, 125, 176, 190, X, X	19,607	25,618	1.31	18,135
Benzyl benzoate	1, 72, 76, 101, 176, 190	3,886	4,475	1.15	3,758
Benzyl butyrate	101				
Benzyl cinnamate	72, 101, 176				
Benzyl formate	176				
Benzyl isoeugenol	176				
Benzyl propionate	176				
Benzylidine acetone	125, 176				

TABLE 10.—*Production and sales of dyes and other finished coal-tar products, 1922*—Continued.

Schultz No.	Common name.	Manufacturer's identification number (according to list on page 117).	Sales.			Production.
			Quantity.	Value.	Average price per pound.	
	PERFUME MATERIALS—continued.		*Pounds.*			*Pounds.*
	Bromstyrol	72, 101, 176, 190	135	$517	$3.83	[illegible]
	Chloracetophenone	68				
	Cinnamic aldehyde	72, 75, 76, 176				
	Cinnamyl acetate	176				
	Cinnamyl alcohol	72, 176				
	Cinnamyl cinnamate	72				
	Diethyl phthalate	72, 76, 101, 176, 190, X, X	714,196	541,788	.76	[illegible]
	Dimethyl anthranilate	176				
	Dimethyl resorcinol	176				
	Diphenylmethane	176, 190				
	Diphenyl oxide	101, X				
	Hydratropic aldehyde	176				
	Iso butyl phenyl acetate	72, 125				
	Iso butyl salicylate	176				
	Methyl acetophenone	176				
	Methyl anisate	176				
	Methyl anthranilate	72, 76, 101, 176, 184, 190	548	2,579	4.71	[illegible]
	Methyl benzoate	72, 76, 137, 164, 176, X				
	Methyl guaiacol	176				
	Methyl-p-tolyl ketone	72				
	Methyl phenyl acetate	72, 125, 176	94	394	4.19	
	Nerolin (b-naphthol ethyl ether)	72, 76, 176				
	b-Naphthyl anthranilate	72				
	Nonyl anthranilate	72				
	Phenyl acetic acid	76				
	Phenylacetic aldehyde	72, 101, 176, 190	413	4,908	11.88	[illegible]
	Phenylethyl acetate	72, 101, 176, 190, X	47	716	15.23	[illegible]
	Phenylethyl alcohol	72, 101, 176, 190	188	1,648	8.77	[illegible]
	Phenylethyl formate	176				
	Phenylethyl phenylacetate	176				
	Phenylethyl propionate	176				
	Phenylpropyl alcohol	192				
	Phenylvinylethylene-methyl ketone	176				
	Salicylic aldehyde	72				
	Yara-yara (b-naphthol methyl ether)	76, 176				
	Total perfume materials		778,696	643,436	.83	[illegible]
	SYNTHETIC PHENOLIC RESINS.					
	Derived from phenol	154, X, X				
	Derived from cresol	125, 154, X, X				
	Derived from coumarone and indene	16				
	Total resins		6,415,931	4,315,196	.67	[illegible]
	Total synthetic tanning materials	13, 105, 204, X	1,981,388	103,398	.05	[illegible]

DYES NOT CLASSIFIED BY SCHULTZ NUMBER.

Manufacturers were requested to report separately in terms of their familiar pre-war designations the production of dyes not classified by Schultz. The following table is a list of such dyes, together with certain new dyes of American development for which there are no foreign equivalents:

Name of dye.	Manufacturers' identification number (according to list on p. 117).
ie brown B	84
ie brown RH	84
ie brown VA	84
	4
and acid violet	X
rown RM	77
n	23
	205
indigo shade)	205
5R	205
(not similar to any pre-	
	70
3G	127
B	127
)G	127
3G	127
ol red 2B	4
rome black DNW	34
rome Bordeaux LR	34
romate brown EB	130
rome violet AH	34
ect green B	4
me green 3G	130
green	129
	129
brown B	6
brown G	6
brown R	6
brown RR	6
k L	4, 64, 130
	64
ge S	64
let 8B	129
ne red B and benzo red	
	64
arlet	64
	X
	4
blue B	127
	55
ein	55, 132
AR, RB, 8B, 3G	127
black NS	127
	X
	25, 44
	44
own R	64
	4, 23
B	38, 70
CB	127
	38
SW	X
ope	44
	25
CLM	77
DF	130
8S	84
8W, 3G	X
	84
	127
R	4
k 2B, G	12, 129
ordeaux B	64
ine B and G	64
lue FFB	64
	77, 84
HA	84
N	129
ack N	127
DM	127
NX, VZ	127

Name of dye.	Manufacturers' identification number (according to list on p. 117).
Diazo Bordeaux 7B	64
Diazo fast red 7BL	64
Direct black EV	129
Direct blue 3RX	38
Direct brown R	129
Direct dark green	4
Direct fast brown BR	143
Direct fast garnet	X
Direct fast orange R	129
Direct fast scarlet	X
Direct fast violet 4B	143
Direct green L	4
Direct salmon red	X
Direct seal brown	X
Erie brown GB	127
Erie fast gray MR	127
Fast brilliant blue EA	4
Fast crimson R	127
Fast wool violet B	127
Hello Bordeaux BL	64
Indanthrene blue BCS (pdr)	64, 129
Lake scarlet G	127
Leather yellow	127
Marine blue	23
Navy blue T	25
Nerol black	4
Nerol 2B	129
New blue	X
Niagara blue NR, RL	127
Oil brown	44
Oil brown M	127
Oil maroon O	127
Oil orange	X
Oil red 3B	200
Oil red O	127
Oil red 3BX	200
Oil red C	200
Oil yellow A, F, 2625	127
Orange Y powder	132
Oxamine blue	X
Oxamine copper blue RRX	64
Oxamine fast claret	X
Oxamine light green G	64
Oxydiamine violet	X
Palachrome maroon	X
Palachrome yellow Y	X
Palaside brown B	X
Palaside green	X
Phloxine B	55
Rapid fast red GL	64
Rosanthrene AWL and B	64
Rosanthrene R	64
Rosanthrene orange	64
Rose bengale 3G	55
Rosolic acid	53
Serichrome black WSE	127
Serichrome green B	127
Silk black 4BF	38
Silk brown G	X
Silk brown R	X
Solamine blue FF	129
Sudan AX	30
Sulphonyl milling red	23
Victoria fast violet 2R	84
Wool black B	129
Wool blue AD, CB, CG	127
Wool blue BM	127
Wool green B	127
Wool navy B	127
Zambesi black D	127
Zambesi black V	38, 64, 127

TABLE 11.—*Comparison of production of dyes and other finished coal-tar products, 1921 and 1922.*

Schultz No.	Product.	Total production	
		1922	1921
	Total finished coal-tar products	*Pounds.* 88,305,131	*Pounds.* 54,457,563
	STILBENE DYES.		
9	Direct yellow R	375,224	153,547
11	Chloramine orange G	102,983	57,362
	PYRAZOLONE DYES.		
23	Tartrazine	551,480	558,134
	MONOAZO DYES.		
32	Butter yellow	25,852	18,521
33	Chrysoidine Y	538,733	253,680
34	Chrysoidine R	52,745	100,248
38	Orange G	124,311	91,783
41	Fast acid fuchsine B	19,004	8,084
42	Amino naphthol red G	99,683	61,433
48	Alizarin yellow G	441,699	271,205
58	Alizarin yellow R	198,362	128,080
61	Victoria violet	146,990	83,453
66	Amino naphthol red 6 B	107,938	90,790
68	Spirit yellow R	42,432	20,837
82	Ponceau 2 R	236,010	178,272
89	Metachrome brown B	312,828	474,128
112	Bordeaux B	167,142	84,754
134	Metanil yellow	290,502	90,235
141	Azo yellow	109,699	125,258
145	Orange II	1,341,971	922,326
154	Palatine chrome brown	44,109	32,080
161	Fast red A	189,389	120,251
163	Azo rubine	372,060	232,236
164	Fast red VR	57,572	144,957
169	Cochineal red	97,196	139,323
173	Lithol red R	228,692	63,194
177	Mordant yellow	20,785	94,214
181	Salicine black U	1,165,939	1,533,229
188	Sulphon acid blue R	60,163	336,079
194	Thiazine red R	2,978	15,228
198	Mimosa C	2,812	3,317
202	Palatine chrome red B	44,550	21,377
	DISAZO DYES.		
211	Resorcin brown	117,753	3,428
217	Agalma black 10 B	1,645,373	1,426,194
227	Brilliant croceine	151,829	34,462
257	Sulphocyanine G	152,807	365,898
265	Sulphocyanine black	149,503	93,796
283	Bismarck brown	185,774	153,695
284	Bismarck brown 2 R	658,060	537,752
303	Paper yellow	25,619	8,225
304	Chrysophenine G	168,454	202,388
333	Oxamine black BHN	700,015	288,852
337	Benzo blue 2 B	503,487	571,217
340	Benzo orange R	73,411	21,222
342	Chrysamine G	12,213	13,228
343	Diamine fast red F	78,030	35,782
344	Diamine brown	123,975	60,410
363	Benzopurpurine 4 B	309,384	152,635
424	Chicago blue 6 B	118,178	83,781
	Total disazo dyes	6,881,392	5,531,365
	TRISAZO DYES.		
462	Direct deep black EW	5,326,457	2,229,842
463	Erie direct black RX	181,308	298,538
464	Erie direct green ET	57,066	30,055
474	Oxamine green B	215,140	153,733
475	Oxamine green G	53,235	62,028
476	Benzamine brown 3 GO	695,602	491,247
477	Congo brown G	234,963	213,403
	TETRAKISAZO DYES.		
485	Benzo brown G	129,436	53,226
	Total azo dyes	22,448,895	17,062,368

TABLE 11.—*Comparison of production of dyes and other finished coal-tar products, 1921 and 1922*—Continued.

Schultz No.	Product.	Total production.	
		1922	1921
	DIPHENYLMETHANE DYES.	*Pounds.*	*Pounds.*
493	Auramine	344,827	94,484
	TRIPHENYLMETHANE DYES.		
512	Magenta (or fuchsine)	84,683	49,797
515	Methyl violet	350,564	190,643
530	Acid violet	125,399	43,043
536	Alkali blue	94,832	73,596
539	Soluble blue	21,059	22,356
	Total triphenylmethane dyes	898,781	727,421
	XANTHONE DYES.		
587	Eosine	74,697	69,073
592	Erythrosine	6,713	6,644
	THIOBENZENYL DYES.		
616	Primuline	252,450	129,281
617	Columbia yellow	230,204	86,418
	OXAZINE AND THIAZINE DYES.		
626	Gallocyanine	82,253	140,004
649	Cotton blue or Meldola's blue	26,289	33,970
659	Methylene blue	372,077	209,395
	AZINE DYES.		
679	Safranine	138,590	52,771
697	Induline (spirit soluble)	45,015	55,339
698	Nigrosine (spirit soluble)	349,325	168,402
699	Induline (water soluble)	121,009	92,988
700	Nigrosine (water soluble)	1,338,093	626,706
	SULPHUR DYES.		
720	Sulphur black	12,877,649	7,832,696
	Sulphur blue	855,091	190,621
	Sulphur brown	1,778,780	1,159,115
	Sulphur green	169,769	70,428
	Sulphur maroon	210,222	230,773
	Sulphur olive	115,702	55,920
	Sulphur tan	242,835	121,390
	Sulphur yellow	544,077	316,399
	Total sulphur dyes	16,913,767	10,239,255
	ANTHRAQUINONE DYES.		
782	Alizarin brown	67,609	59,613
	INDIGO AND ITS DERIVATIVES.		
874	Indigo, synthetic	15,850,752	6,673,968
877	Indigo extract	543,044	585,931
	Total dyes	64,632,187	39,008,690
	COLOR LAKES.		
	Black lakes	544,284	242,095
	Blue lakes	840,584	360,807
	Brown lakes	199,932	27,986
	Eosine lakes	482,639	309,326
	Green lakes	420,824	200,924
	Lithol red lakes	555,716	277,733
	Maroon lakes	822,105	560,775
	Orange lakes	628,813	233,818
	Para red	2,388,976	1,925,017
	Red lakes	1,651,649	1,002,749
	Scarlet lakes	783,001	438,115
	Violet lakes	471,659	182,021
	Yellow lakes	734,870	190,988
	Total color lakes	10,578,664	6,152,187
	Total photographic chemicals	345,798	183,798

TABLE 11.—*Comparison of production of dyes and other finished coal-tar products, 1921 and 1922*—Continued.

Schultz No.	Product.	Total production.	
		1922	1921
	MEDICINALS.	*Pounds.*	*Pounds.*
	Acetanilide	222,517	207,433
	Arsphenamine	865	670
	Aspirin (acetylsalicylic acid)	1,482,998	733,510
	Phenolsulphonates (calcium, sodium, zinc, etc)	309,993	28,438
	Sodium salicylate	467,264	319,356
	Total medicinals	2,946,347	1,545,917
	FLAVORS.		
	Coumarin	72,350	32,087
	Ethyl benzoate	4,370	5,551
	Methyl cinnamate	2,332	2,790
	Methyl salicylate	854,763	660,940
	Total flavors	1,215,668	901,248
	PERFUME MATERIALS.		
	Acetophenone	194	103
	Amyl salicylate	11,010	3,327
	Anisic aldehyde	805	2,197
	Benzyl acetate	18,135	7,191
	Benzyl benzoate	3,768	13,789
	Bromstyrol	139	252
	Diethyl phthalate	725,984	73,937
	Methyl anthranilate	625	653
	Phenylacetic aldehyde	411	822
	Phenylethyl alcohol	202	157
	Total perfumes	793,148	119,335
	Total synthetic phenolic resins	5,944,133	1,643,796
	Total synthetic tanning materials	1,910,519	1,902,567

EMPLOYEES AND RATES OF PAY.

Reports were made by 177 of the 209 firms manufacturing coal-tar products concerning the number of employees receiving specified rates of pay on December 18, 1922, or the nearest representative date for which this information could be obtained. The data returned are contained in Table 12. The 32 firms not reporting either conducted a business in which coal-tar products were not the primary articles of manufacture or they did not have separately organized departments dealing with coal-tar products. The 177 firms reported a total of 16,259 employees, an increase of 2,967 over 1921. The number of employees in 1921 in turn represented a decrease of 8,895 from 1920. The chemists and technically trained men in 1922 totaled 1,757, or 10.8 per cent of all employees. In 1921 there were 1,722 men of this class constituting 12.9 per cent of all employees. Of chemists and technically trained men in 1922, 29.93 per cent received $50 or more but under $75 per week; 22.81 per cent received $75 per week and over; 9.85 per cent received $40 or more but under $45 per week; 9.27 per cent received $45 or more but under $50 per week; 6.55 per cent received $35 or more but under $40. Of men without technical training 29.16 per cent received $20 or more but under $25 per week; 22.13 per cent received $25 or more but under $30 per week; and 20.03 per cent received $15 or more but under $20 per week.

n general, the wages of 1922 for chemists and technically trained n showed a small increase over wages in 1921, whereas for all men hout technical training there was a small reduction during the ne period. Table 12 contains a comparison for specified rates pay of technically trained men and of men without such training. ong the technically trained men, there was an increase of about 4 cent in the pay of each of the three classes receiving $40 to $45, to $50, and $50 to $75 per week. Of men without technical ining, there was a decrease of about 7 per cent in the weekly wages the two classes receiving $25 to $30 and $30 to $35 per week.

In 1919 the dye and coal-tar chemical industry had probably a ger proportion of technically trained men than were in any other nufacturing industry in the United States.

There is a striking contrast between the size of the industry in 14 and in 1922. According to the bureau of the Census, the mber of employees engaged in the manufacture of coal-tar colors d other products in 1914 was 528, divided as follows: Salaried ployees, 130; wage earners (average number), 398. The total mber of firms engaged in this industry during that year was seven.

TABLE 12.—*Employees and rates of pay, dye and coal-tar chemical industry, 1922.*

Wages per week.	Number of employees at each specified wage engaged in manufacturing operations.			Percentage receiving each specified wage.		Percentage receiving each specified wage or more.	
	Chemists and technically trained men.	Men without technical training.	All employees.	Of all chemists and technically trained men.	Of all men without technical training.	Of all chemists and technically trained men.	Of all men without technical training.
r $10	3	97	100	0.17	0.67	100.00	100.00
ut under $15	13	495	508	.74	3.41	99.83	99.33
ut under $20	35	2,905	2,940	1.99	20.03	99.09	95.92
ut under $25	73	4,229	4,302	4.16	29.16	97.10	75.89
ut under $30	153	3,210	3,363	8.72	22.13	92.94	46.73
ut under $35	102	1,882	1,984	5.81	12.98	84.22	24.60
ut under $40	115	871	986	6.55	6.01	78.41	11.62
ut under $45	173	481	654	9.85	3.32	71.86	5.61
ut under $50	163	193	356	9.27	1.33	62.01	2.29
ut under $75	526	131	657	29.93	.90	52.74	.96
d over	401	8	409	22.81	.06	22.81	.06
Total	1,757	14,502	16,259	100.00	100.00	.....	.....

Wages per week	Percentage receiving each specified wage or more.					
	Of all chemists and technically trained men.			Of all men without technical training.		
	1922	1921	Increased percentage.	1922	1921	Decreased percentage.
ut under $15	99.8	.....	.....	99.3	99.4	0.1
ut under $20	99.1	99.2	0.1	95.9	95.4	[1].5
ut under $25	97.1	96.6	[1].5	75.9	78.1	2.2
ut under $30	92.9	90.7	[2]2.2	46.7	52.8	6.1
ut under $35	84.2	84.5	.3	24.6	32.5	8.9
ut under $40	78.4	76.7	[2]1.7	11.6	15.7	4.1
ut under $45	71.9	67.7	[2]4.2	5.6	8.8	3.2
ut under $50	62.0	58.1	[2]3.9	2.3	4.4	2.1
ut under $75	52.7	48.9	[2]3.8	1.0	2.5	1.3
d over	22.8	23.5	.7	.1	.4	.5

[1] Decrease. [2] Increase.

Research Work.

Of the 209 firms engaged in the manufacture of dyes and other coal-tar chemicals, 67 had separately organized research laboratories for the solution of technical problems and for the development or discovery of new products. The net operating expenses of these laboratories, together with research work done in the laboratories not separately organized for research, were $2,172,508. This includes salaries, apparatus, and materials, after deducting the value of salable products made in the research laboratories. The figure for 1922 shows a decrease of $2,074,160 compared with that of 1921. This figure is doubtless an understatement of the real cost of experimental work, since it does not include, in all cases, the cost of research done as a part of manufacturing operations and not shown on the books of the companies as a charge against research.

The coal-tar chemical industry in the United States has expended $21,545,915 in research work alone, according to reports to the Tariff Commission during the last five years (1917–1922;) with the exception of the year 1917, this is net, and does not include the value of salable products made in the experimental department. The energetic and extensive investigations into the manufacture of dyes have been greater probably than in any other field of chemical research. The achievements of this period, 1917–1922, namely the establishment of a large dye and synthetic organic chemical industry, with its early progress and developments, must be attributed in no small part to the enormous expenditures in research. New dyes and other chemicals have been developed each year. The costs of production have been reduced, as reflected in the prices of dyes. A large expenditure for research is essential if an industry is to be self-contained and placed on a stable, efficient basis of operation. Not only must the industry consider, as in the past, the production of products already in existence, but the development and discovery of new dyes, pharmaceuticals, and other products are necessary if the industry is to develop and maintain a competitive position in the world's markets. The expenditures for research decreased during 1921, and still more so in 1922, because many concerns were obliged to retrench when business conditions were poor. While this no doubt retarded the progress of the industry to some extent, there were nevertheless advances made during that period and better progress may be expected during 1923.

PART III.

YES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1922 CALENDAR YEAR.

Part III.

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1922 CALENDAR YEAR.

INTRODUCTORY.

Since 1919 the United States Tariff Commission has compiled a detailed census of dye imports similar to that published by the Department of Commerce under the title Artificial Dyestuffs used in the United States (fiscal year 1913 and 1914), commonly known as the "Norton Import census."

The commission first compiled such statistics for use in the administration of section 501, Title 5, of the act of September 8, 1916, making the continuance of specific duties on coal-tar products after September 8, 1921, dependent upon whether there should be produced in the United States as much as 60 per cent in value of the consumption of these products. As the information was found to be of direct value to manufacturers, consumers, and importers, as well as to the commission itself, the census of imports was continued into 1922. Through cooperation with the Treasury Department the figures were compiled from invoices of shipments of dyes to the various ports of the United States. Statistics of warehouse withdrawals were incomplete for 1921, as figures could not be obtained in cases where only a portion of a shipment had been withdrawn. It was possible to obtain a complete record of warehouse withdrawals during 1922 which makes the statistics for this year more complete than those of the preceding year.

In tabulating the statistics the commission has followed in the main the Schultz Farbstoff Tabellen (1914 edition), which is based on the chemical composition of the dye. Certain types were also identified according to the Norton census and others according to sources of information in the files of the Tariff Commission. Dyes identified by Norton as "a, b, and c" classes under a given Schultz number are listed under that number (without subdivision) except in a few instances where they were incorrectly designated. Dyes included under these "a, b, and c" classes are not always chemically identical with the original Schultz types. Those dyes which could not be identified by Schultz numbers are classified by the ordinary method of application as follows: Acid, basic, direct, lake and spirit-soluble, mordant and chrome, sulphur, and vat. In many cases the classification of a dye by its method of application is arbitrary, as certain colors may be applied by either of two methods. A few dyes could not be classified by either the Schultz tables or the method of application, and are therefore listed under the heading "unclassified and unidentified dyes."

The Tariff Commission does not vouch for the accuracy of these classifications, as the identifications were supplied by dye experts,

and by foreign manufacturers; it was not possible to make a chemical examination of each dye imported.

In the case of English dyes the published value includes c. i. f. charges. In the case of Swiss dyes all extra charges are included. The German invoices vary, but usually the extra charges are included in the invoice values.

The approximate value of the extra charges incident to importation of coal-tar colors into the United States in 1922 is as follows:

1. *Consular certification.*—A fee of $2.50 for all invoices covering shipments the value of which exceeds $100.

2. *Freight.*—This includes freight to seaport and ocean freight. The cost of freight from all German factories to New York, as furnished by one large importer, was $0.0147 per pound. The cost of freight from Basel to New York in the case of a large shipment of colors was $0.01 per pound. The freight cost varies of course to a considerable degree, as it depends upon the packing, the size of shipments, and other factors.

3. *Insurance* charges for shipments from factory to New York in the case of German dyes as reported by a large importer were $0.0043 per $1. In the case of a large shipment of Swiss dyes from Basel, the insurance charge was $0.005 per $1.

4. *Packing.*—These charges for dyestuffs as reported by a large importer were as follows:

Quantity (kilos).	Powder products (charges per kilos).	Paste products (charges per kilos).	Quantity (kilos).	Powder products (charges per kilos).	Paste products (charges per kilos).
	Marks.	*Marks.*		*Marks.*	*Marks.*
1 to 10	30	35	51 to 100	6	10
11 to 25	10	15	101 to 150	5	8
26 to 50	8	12	151 and above	4	6

For liquid products in iron drums the packing charges were:

Drums containing—	Marks.
100 liters	3,000
250 liters	4,250
500 liters	7,500
540 liters	8,000

The rate of exchange used in converting the foreign invoice value to United States currency was the rate given on the invoice.

1. THE SIX LEADING GERMAN COMPANIES.

.....Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.
.....Badische Anilin- und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.
.....Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.
.....Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.
.....Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branch in Russia.
.....Farbwerke vorm. Meister Lucius & Brüning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2. THE SEVEN SMALLER GERMAN COMPANIES.

.....Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.
.....Chemikalienwerk Greisheim G. m. b. H., Griesheim on the Main. Founded 1881.
.....Carl Jäger G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.
.....Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.
.....Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.
.....Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.
.....Wülfing, Dahl & Co., A. G. Barmen. Founded 1842.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES.

.....Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
.....Niederlandische Farben- und Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897. Branch in Russia.
.....Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
.....Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL.

.....Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
.....Anilinfarben- und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany, and Russia.
.....Gesellschaft fur chemische Industrie. Founded 1885. Branch in France.
.....Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES.

.....Brotherton and Co. (Ltd.), City Chambers, Leeds.
.C....British Alizarine Co. (Ltd.), Silvertown.
.....British Dyestuffs Corporation (Ltd.), London.
'o.....The Clayton Aniline Co. (Ltd.), Clayton, Manchester.
.....The Colne Vale Dye and Chemical Co. (Ltd.), Milnsbridge, Huddersfield.
.....L. B. Holliday and Co. (Ltd.), Huddersfield.
.....Solway Dyes Co., Carlisle.
.....Scottish Dyes (Ltd.), Grangemouth.

TABLE 15.—*Imports of dyes, calendar year 1922.*

[This table gives details as to the quantity and invoice value of each dye imported, together with the various commercial types and their corresponding foreign manufactures.]

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
	Total		*Pounds.* 3,982,631	$5,243,257
6	Martius yellow		200	
	Napthaline yellow	Q		
	Martius yellow	A		
9	Direct yellow		25	
	Naphtamine yellow BN	K		
11	Chloramine orange		30	2
	Micado brown B	L		
	Micado brown G	L		
	Micado brown M	L		
18	Diphenyl fast yellow		6,458	
	Diphenyl chlorine yellow FF supra 287	G		
19	Fast light yellow		25,555	46,602
	Erio flavine SX	G		
	Erio flavine SX 654	G		
	Fast light yellow GG	By		
	Fast light yellow GGG	By		
	Fast light yellow G	By		
22	Xylene light yellow		13,506	
	Xylene light yellow 2G conc	S		
	Xylene light yellow R	S		
28	Hansa yellow G		6,294	3,82
	Hansa yellow 5G lumps 650	M		
	Hansa yellow G lumps	M		
	Hansa yellow G paste	M		
29	Erio chrome red		20,227	
	Erio chrome red B 915	G		
	Erio chrome red G 978	G		
38	Orange G			
	Orange 2RL	C	100	
40	Chromotrope 2R	M	1	
42	Amido naphthol red G		299	
	Erio floxine 2G conc. 575	G		
56	Autol red		4,001	
	Autol red BL powder	B		
	Nitrosamine red paste	B		
57	Chromotrope 2B	M	1	
58	Ultra orange R	S	251	
63	Azo acid blue		201	
	Azo acid blue B conc	S		
64	Lanafuchsine		1,012	
	Sorbine red X	B		
	Sorbine red BB	B		
67	Fast acid red	BD	100	
87	Peri wool blue		450	
	Peri wool blue B	C		
	Peri wool blue G	C		
88	Acid anthracene brown		2,632	
	Acid anthracene brown R	By		
	Acid anthracene brown RH extra	By		
91	Anthracyl chrome green	WD	441	
100	Eosamine B	A	6,118	
106	Autol red RLP powder	B	1	
118	Geranine		201	
	Geranine G 295	By		
121	Erica B		2,458	8,06
	Erica B conc	S		
	Erica B extra	B		
	Erica B extra	A		
	Erica BN	L		
124	Janus green		1	
	Janus green G	M		
	Janus green B	M		
125	Diazine black G	K	1,250	
126	Janus blue B	M	13	
133	Erio chrome phosphine R		2,498	2,49
	Erio chrome phosphine R	G		
	Erio chrome phosphine RR 958	G		
	Erio chrome phosphine	G		
	Erio chrome phosphine R 957	G		
139	Orange IV	M	4	
140	Curcumeine		5,834	3,49
	Chromocitronine R powder	DH		
	Chromocitronine V powder	DH		
	Jasmine high conc 729	G		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
141	Azo yellow		248	
	Azo flavine F. F. UX	B		
	Azo flavine conc	Q		
145	Orange II extra conc	B	25	
147	Azo fuchsine S	Q	99	
151	Orange RO	B	201	
154	Palatine chrome brown RX	B	500	
158	Chrome brown RVV 899	G	1,020	
159	Acid alizarin black		23,975	
	Acid alizarin black R	S		
160	Naphtylamine brown	B	5	
177	Mordant yellow		4,628	$6,550
	Milling yellow O	C		
	Milling yellow 3G	C		
	Chrome yellow DF powder	By		
180	Erio chrome blue black BC		14,227	
	Erio chrome blue black BC 926	G		
	Erio chrome blue black G 925	G		
182	Brilliant sulphur red		9,557	11,796
	Brilliant sulphon red B	S		
	Brilliant sulphon red 10B	S		
	Fast sulphon violet 5BS	S		
183	Erio chrome black T 934	G	13,977	
184	Erio chrome black A		24,499	
	Erio chrome black A 922	G		
	Erio chrome black E 965	G		
187	Lanacyl blue marine B	C	556	
198	Thiazol yellow		16,196	
	Mimosa Z conc. 331	G		
206	Diphenyl catechine G 133	G	17,000	
207	Diphenyl fast brown GNC		9,797	
	Diphenyl fast brown GNC 129	G		
	Diphenyl fast brown GF 365	G		
211	Resorcine brown F	K	350	
212	Acid brown RN 532	G	849	
217	Naphtylamine black		52	
	Naphtylamine black 10B	By		
	Naphtylamine black 4B	C		
220	Palatine black		11,436	
	Palatine black 4BXX	B		
	Wool black GRF	A		
222	Janus yellow G	M	1,200	
227	Brilliant croceine		277	
	Cotton scarlet extra	B		
	Brilliant croceine OF	K		
240	Janus red B	M	1,570	
241	Neutral grey G		550	
	Diamine grey G	C		
247	Scarlet E. C		99	
	Imperial scarlet 3B	By		
260	Erio chrome verdon		16,562	
	Erio chrome verdon S 1042	G		
	Alizarine chrome green A	S		
262	Victoria black		251	
	Victoria black B	By		
265	Sulpho cyanine black		14,858	12,465
	Acid milling black B 652	G		
	Acid milling black B 652 conc	G		
	Sulphon cyanine black 2B	By		
266	Naphthylamine black		51	
	Naphthylamine black 6B	C		
273	Diaminogene blue		22,420	
	Diaminogene blue NA	C		
	Diaminogene blue BB	C		
274	Diaminogene B		8,527	13,382
	Diaminogene extra	C		
	Diazo indigo blue 2RL	By		
	Zambesi pure blue 4B	A		
276	Diamond green		2,786	
	Diamond green SS	By		
	Diamond green 3G	By		
279	Benzo fast scarlet		992	
	Direct fast scarlet SE	I		
293	Milling red		9,955	
	Acid milling red G conc. 631	G		
294	Fast mordant yellow		820	
	Fast mordant yellow G powder	B		
296	Cotton yellow		3,579	
	Benzo fast yellow 4GL extra	By		
	Benzo fast yellow RL	By		

TABLE 15.—*Imports of dyes, calendar year 1922.*

[This table gives details as to the quantity and invoice value of each dye imported, together with various commercial types and their corresponding foreign manufactures.]

Schultz No.	Dye.	Manufacturer.	Import	
			Quantity.	
			Pounds.	
	Total		3,982,631	$
6	Martius yellow		200	
	Napthaline yellow	Q		
	Martius yellow	A		
9	Direct yellow		23	
	Naphtamine yellow BN	K		
11	Chloramine orange		30	
	Micado brown B	L		
	Micado brown G	L		
	Micado brown M	L		
18	Diphenyl fast yellow		6,458	
	Diphenyl chlorine yellow FF supra 287	G		
19	Fast light yellow		25,555	
	Erio flavine SX	G		
	Erio flavine SX 654	G		
	Fast light yellow GG	By		
	Fast light yellow GGG	By		
	Fast light yellow G	By		
22	Xylene light yellow		13,506	
	Xylene light yellow 2G conc	S		
	Xylene light yellow R	S		
28	Hansa yellow G		6,294	
	Hansa yellow 5G lumps 650	M		
	Hansa yellow G lumps	M		
	Hansa yellow G paste	M		
29	Erio chrome red		20,227	
	Erio chrome red B 915	G		
	Erio chrome red G 978	G		
38	Orange G			
	Orange 2RL	C	100	
40	Chromotrope 2R	M	1	
42	Amido naphthol red G		399	
	Erio floxine 2G conc. 575	G		
56	Autol red		4,001	
	Autol red BL powder	B		
	Nitrosamine red paste	B		
57	Chromotrope 2B	M	1	
58	Ultra orange R	S	251	
63	Azo acid blue		201	
	Azo acid blue B conc	S		
64	Lanafuchsine		1,012	
	Sorbine red X	B		
	Sorbine red BB	B		
67	Fast acid red	BD	100	
87	Peri wool blue		450	
	Peri wool blue B	C		
	Peri wool blue G	C		
88	Acid anthracene brown		2,632	
	Acid anthracene brown R	By		
	Acid anthracene brown RH extra	By		
91	Anthracyl chrome green	WD	441	
100	Eosamine B	A	6,118	
106	Autol red RLP powder	B	1	
118	Geranine		201	
	Geranine G 295	By		
121	Erica B		2,458	
	Erica B conc	S		
	Erica B extra	B		
	Erica B extra	A		
	Erica BN	L		
124	Janus green		1	
	Janus green G	M		
	Janus green B	M		
125	Diazine black G	K	1,250	
126	Janus blue B	M	13	
133	Erio chrome phosphine R		2,498	
	Erio chrome phosphine R	G		
	Erio chrome phosphine RR 958	G		
	Erio chrome phosphine	G		
	Erio chrome phosphine R 957	G		
139	Orange IV	M	4	
140	Curcumeine		5,834	
	Chromocitronine R powder	DH		
	Chromocitronine V powder	DH		
	Jasmine high conc 729	G		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
141	Azo yellow		248	
	Azo flavine F. F. UX	B		
	Azo flavine conc	Q		
145	Orange II extra conc	B	25	
147	Azo fuchsine S	Q	99	
151	Orange RO	B	201	
154	Palatine chrome brown RX	B	500	
158	Chrome brown RVV 899	G	1,020	
159	Acid alizarin black		23,975	
	Acid alizarin black R	S		
160	Naphtylamine brown	B	5	
177	Mordant yellow		4,628	$6,550
	Milling yellow O	C		
	Milling yellow 3G	C		
	Chrome yellow DF powder	By		
180	Erio chrome blue black BC		14,227	
	Erio chrome blue black BC 926	G		
	Erio chrome blue black G 925	G		
182	Brilliant sulphur red		9,557	11,796
	Brilliant sulphon red B	S		
	Brilliant sulphon red 10B	S		
	Fast sulphon violet 5BS	S		
183	Erio chrome black T 934	G	13,977	
184	Erio chrome black A		24,499	
	Erio chrome black A 922	G		
	Erio chrome black E 965	G		
187	Lanacyl blue marine B	C	556	
198	Thiazol yellow		16,196	
	Mimosa Z conc. 331	G		
206	Diphenyl catechine G 133	G	17,000	
207	Diphenyl fast brown GNC		9,797	
	Diphenyl fast brown GNC 129	G		
	Diphenyl fast brown GF 365	G		
211	Resorcine brown F	K	350	
212	Acid brown RN 532	G	849	
217	Naphtylamine black		52	
	Naphtylamine black 10B	By		
	Naphtylamine black 4B	C		
220	Palatine black		11,436	
	Palatine black 4BXX	B		
	Wool black GRF	A		
222	Janus yellow G	M	1,200	
227	Brilliant croceine		277	
	Cotton scarlet extra	B		
	Brilliant croceine OF	K		
240	Janus red B	M	1,570	
241	Neutral grey G		550	
	Diamine grey G	C		
247	Scarlet E. C		99	
	Imperial scarlet 3B	By		
260	Erio chrome verdon		16,502	
	Erio chrome verdon S 1042	G		
	Alizarine chrome green A	S		
262	Victoria black		251	
	Victoria black B	By		
265	Sulpho cyanine black		14,858	12,465
	Acid milling black B 652	G		
	Acid milling black B 652 conc	G		
	Sulphon cyanine black 2B	By		
266	Naphthylamine black		51	
	Naphthylamine black 6B	C		
273	Diaminogene blue		22,420	
	Diaminogene blue NA	C		
	Diaminogene blue BB	C		
274	Diaminogene B		8,527	13,382
	Diaminogene extra	C		
	Diazo indigo blue 2RL	By		
	Zambesi pure blue 4B	A		
276	Diamond green		2,796	
	Diamond green SS	By		
	Diamond green 3G	By		
279	Benzo fast scarlet		992	
	Direct fast scarlet SE	I		
293	Milling red		9,955	
	Acid milling red G conc. 631	G		
294	Fast mordant yellow		820	
	Fast mordant yellow G powder	B		
296	Cotton yellow		3,579	
	Benzo fast yellow 4GL extra	By		
	Benzo fast *yellow RL*	By		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
304	Chrysophenine		301	
	Chrysophenine conc. pure	S		
306	Pyramine orange 3G	B	2,110	
314	Pyramine orange RR	B	35	
315	Congo orange G	A	50	
319	Diamine scarlet		14,137	$15,0
	Diamine scarlet B	C		
	Diamine scarlet 3B	C		
	Chloramine red B	S		
	Chloramine red B	I		
	Chloramine red 3B	S		
322	Trisulphon violet B	S	251	
326	Oxy diamine violet		1,413	1,2
	Benzo violet	By		
	Benzo violet O	By		
	Naphthamine violet BE	K		
332	Benzo fast red		6,662	
	Benzo fast red	By		
	Benzo fast red 8BL	By		
338	Naphthamine blue		1,991	
	Naphthamine blue GEF 91 per cent	K		
	Naphthamine blue 3R	K		
340	Benzo orange R	S	201	
342	Chrysamine		4,432	
	Chrysamine K	S		
343	Diamine fast red		4,321	
	Chloramine fast red F	S		
	Diamine fast red 8BL	C		
344	Diamine brown		152	
	Diamine brown 3G	C		
	Direct dark brown M	L		
346	Oxamine red		110	
	Oxamine red 3BX	B		
348	Diphenyl brown BN		2,598	
	Diphenyl brown BBNC 132	G		
	Diphenyl brown GS 199	G		
349	Diamine brown B		662	
	Diamine brown B	C		
354	Direct gray R		12,608	
	Direct gray R paste 1022	G		
358	Diphenyl red		33,945	38,0
	Aceto purpurine 8B	Q		
	Aceto purpurine 8B	B		
	Aceto purpurine 8B	A		
	Toluylene red	GrE		
	Toluylene red OO	GrE		
	Chloramine red 8BS	By		
	Diphenyl red SC 373	G		
	Chloramine red 8B conc	I		
	Chloramine red 8BS	I		
	Chlorantine red 8BS	Q		
359	Trypan red	Q	4	
360	Pyramine orange R	B	1,946	
361	Sulphonazurine		904	
	Sulphonazurine D	By		
364	Diazo brilliant black		7,769	8,8
	Diazo brilliant black B	Q		
	Diazo brilliant black B	By		
	Diazo brilliant black B conc. 70 per cent	By		
366	Delta purpurine		3,243	
	Delta purpurine 5B	By		
	Delta purpurine 3B	By		
370	Brilliant congo		120	
	Brilliant congo R	By		
373	Congo orange		300	
	Congo orange R	A		
386	Chloramine blue		2,502	
	Chloramine blue BXR	S		
391	Typhan blue	M	2	
392	Toluylene orange		36,920	45,0
	Pyrazol orange G	S		
	Pyrazol orange G conc	S		
	Toluylene fast orange GL	By		
400	Acid anthracene red		250	
	Acid anthracene red 5BL	By		
404	Diamine yellow N		535	
	Diamine yellow N 110 per cent	C		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
416	Brilliant azurine 5G		1,270	
	Brilliant azurine 5G	By		
	Brilliant azurine 5G 30 per cent	By		
424	Chicago blue 6B		7,337	$7,177
	Chloramine sky blue FF	S		
	Chloramine sky blue FF conc	S		
	Chloramine sky blue FF conc. 200 per cent	S		
	Diamine sky blue FF	C		
425	Benzamine pure blue		1,751	
	Chloramine sky blue A conc	S		
	Chloramine sky blue A conc. 200 per cent	S		
436	Columbia black		7	
	Columbia black FF	A		
446	Benzo olive	By	50	
448	Diamine bronze R		1,040	
	Diamine bronze G	C		
449	Trisulphon brown		45,697	74,935
	Trisulphon brown B	S		
	Trisulphon brown B 12	S		
	Trisulphon brown B conc	S		
	Trisulphon B conc, 200 per cent	S		
	Trisulphon brown MB	S		
451	Congo fast blue		17,012	
	Chlorantine fast blue RL conc	I		
456	Benzo fast blue		6,997	12,145
	Benzo fast blue 4GL	By		
	Benzo fast blue 4GL	Q		
	Benzo fast blue 2GL	By		
	Benzo fast blue B	Q		
457	Trisulphon brown GG		37,648	32,114
	Trisulphon brown GG	S		
	Trisulphon brown GG conc	S		
	Trisulphon brown GG conc	I		
	Trisulphon brown GG 12	S		
	Trisulphon brown GG2G	S		
	Trisulphon brown GG2G	I		
462	Direct deep black		4,409	
	Direct deep black EW	By		
	Carbide fast black GF conc	I		
471	Chloramine blue 3G	S	1,261	
484	Acid milling scarlet		440	
	Cloth fast red R conc	I		
	Cloth fast red B conc	I		
493	Auramine		12,599	11,382
	Auramine OO	I		
	Auramine O	S		
	Auramine Y	Q		
	Auramine conc	B		
494	Auramine G		110	
	Auramine G 437	G		
495	Malachite green		14	
	Malachite green	Q		
	Diamond green BXX powder	B		
496	Setoglaucine		1,198	
	Setoglaucine 753	G		
498	Turquoise blue		12	
	Turquoise blue G	By		
499	Brilliant green		1	
	Brilliant green conc	B		
500	Setopaline		2,824	
	Setopaline conc. 707	G		
	Setocyanine 396	G		
503	Neptune green		1,661	
	Neptune green sgx	B		
	Benzyl green B conc	I		
505	Light green (yellowish)		300	
	Light green SF yellowish XX	B		
506	Erioglaucine		25,852	47,916
	Erioglaucine	G		
	Erioglaucine EP 548	G		
	Erioglaucine supra 528	G		
	Erioglaucine AC 501	G		
	Erioglaucine AP 545	G		
	Erioglaucine AP 545	I		
507	Xylene blue VS		10,310	
	Xylene blue VS	S		
	Xylene blue VS conc	S		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
508	Xylene blue AS		4,441	
	Xylene blue AS	S		
	Xylene blue AS conc	S		
512	Magenta		7	
	New Magenta C	M		
514	Red violet		11	
	Violet R	Q		
515	Methyl violet		204	$97
	Methyl violet 5R	M		
	Methyl violet 6B 80	Q		
	Methyl violet B extra	B		
	Methyl violet BB extra	B		
	Methyl violet NFB	B		
516	Crystal violet		4,331	1,60
	Crystal violet 10B	C		
	Crystal violet extra	B		
	Crystal violet extra powder	B		
517	Benzyl violet		2	
	Methyl violet 6B extra	B		
518	Ethyl purple		2,125	2,26
	Ethyl violet	B		
	Ethyl violet	Q		
	Ethyl violet conc	B		
521	Aniline blue		10	
	Night blue	Q		
522	Victoria blue 4R		366	
	Victoria blue 4R highly conc	B		
	Victoria blue 4R conc	I		
523	Fast green		52,498	99,72
	Fast green extra bluish	Q		
	Fast green extra bluish	By		
	Fast green extra bluish conc. 60 per cent	By		
	Fast green extra bluish	By		
	Fast green extra blue shade	By		
	Fast light green	By		
524	Acid magenta		452	
	Acid magenta	C		
	Acid magenta (BASF)	B		
527	Acid violet 4BN		4,275	5,85
	Acid violet 4BNS	S		
	Acid violet 4BNS conc	S		
	Acid violet N	M		
528	Fast acid violet 10B		996	
	Kiton fast violet 10B conc	I		
530	Acid violet		1,874	
	Guinea violet 4B	A		
531	Eriocyanine		14,808	40,55
	Eriocyanine A 665	G		
	Eriocyanine A 665 conc	G		
	Eriocyanine AC 503	G		
534	Acid violet 7B		15	
	Acid violet 7B conc	B		
535	Methyl alkali blue		25	
	Methyl alkaline blue MLB	M		
536	Alkali blue		1,102	
	Alkali blue 3R conc	M		
537	Methyl blue for silk		9,926	37,01
	Methyl Lyons blue	G		
	Methyl Lyons blue 410	G		
	Silk blue IV	By		
	Methyl silk blue NCW 706	G		
539	Soluble blue		2,192	5,10
	Soluble blue T	B		
	Soluble blue IN	B		
	Silk blue BT 5BOO	GrE		
	Silk blue extra conc	Q		
	Pure blue conc	M		
	Water blue 32129	A		
543	Patent blue		49,136	61,33
	Tetra cyanole A	A		
	Tetra cyanole A	M		
	Tetra cyanole V	M		
	Tetra cyanole	C		
	Tetra cyanole	M		
	Patent blue V	M		
	Patent marine blue LE	M		
	Kiton pure blue V conc	I		
	Neptune blue BGX conc	B		
	Brilliant acid blue V	By		
544	Cyanine B		400	
	Cyanine B	M		
	Cyanine B 544	M		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

ultz o.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
545	Patent blue A		3,436	$7,118
	Patent blue A	M		
	Patent blue AS conc	I		
	Brilliant acid blue FF	By		
546	Cyanol		20,658	48,755
	Cyanol FF	C		
	Cyanol FF	Q		
	Cyanol FF	By		
	Cyanol FF extra	C		
	Cyanol extra	C		
	Cyanol extra	Q		
	Cyanol extra packing	C		
	Xylene cyanol FF	S		
	Xylene cyanol FF extra	S		
	Xylene cyanol FF extra conc	S		
548	Acid violet 6BN		9,980	
	Acid violet 6BN conc	I		
551	Erio chrome azurol BC		43,191	132,298
	Erio chrome azurol BX 1041	G		
	Erio chrome azurol BX 1041 conc	I		
	Erio chrome azurol BX conc. 1045	G		
	Chrome fast pure blue BX conc	L		
552	Chromal blue		996	
	Chromal blue GC	G		
	Chromal blue GC for printing 939	G		
553	Eriochrome cyanine RC		881	
	Eriochrome cyanine RC 935	G		
555	Aurine		666	
	Aurine	Q		
	Aurine SIS	A		
558	Victoria blue R		882	
	Victoria blue R	I		
	New Victoria blue B	By		
559	Victoria blue B		3,442	8,401
	Victoria blue	Q		
	Victoria blue B	B		
	Victoria blue B	I		
	Victoria blue B base	I		
	Victoria blue B base	B		
	Victoria blue B extra conc	B		
	Victoria blue B highly conc	B		
	Victoria blue base	I		
	Victoria blue B	G		
	Victoria brilliant blue B	M		
	Victoria pure blue BO	B		
560	Night blue		214	
	Night blue	B		
	Night blue	M		
	Night blue	I		
562	Fast acid blue		8,961	18,537
	Fast acid blue B	By		
	Brilliant wool blue FFR extra	By		
	Brilliant wool blue G extra	By		
	Acid blue RBF	I		
	Acid blue RBF conc	I		
	Wool blue SR extra	By		
564	Naphthalene green		19,298	48,825
	Naphthalene green V	M		
	Xylene fast green B conc	S		
	Kiton fast green V conc	I		
	Erio green B supra 657	G		
565	Acid blue B		537	1,099
	Wool blue 3R	BD		
	Wool blue 5B	A		
566	Wool green S		3,503	
	Wool green S conc	S		
	Wool green S conc	G		
568	Pyronine G		4	
	Pyronine G extra conc	M		
569	Acridine red		100	288
	Acridine red 3B	L		
	Acridine red 3B	B		
	Acridine red B	L		
571	Rhodamine 6G		13,545	52,021
	Rhodamine 6G DN	B		
	Rhodamine 6G DN extra	B		
	Rhodamine 6G DN extra	Q		
	Rhodamine 6G DN extra	By		
	Rhodamine 6G DN X	Q		
	Rhodamine 6G DN conc	GrE		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
672	Azo carmine GX		9,327	
	Azo carmine GX	B		
	Azo carmine GX powder	B		
673	Azo carmine B		3,555	
	Rosinduline 2B bluish	K		
676	Neutral blue R	I	110	
679	Safranine		34	$121
	Saffranine	Q		
	Saffranine T extra conc	B		
	Saffranine O for spirit lake	B		
681	New fast grey		3,628	1,968
	Maltagrey B	P		
	Maltagrey J	P		
	Maltagrey J	Q		
686	Iris violet extra	B	6	
687	Rosolane CTR		1,775	7,992
	Methylene Heliotrope Extra Strong	M		
	Rosolane R Paste	K		
	Rosolane Extra strong	M		
688	Rosolane		275	528
	Rosolane paste	P		
	Rosolane paste	Q		
	Rosolane O	M		
690	Metaphenylene blue R		2,714	
	Diphene blue R	A		
698	Nigrosine alcohol soluble	Q	22	
699	Induline NN		52	
	Induline NN	B		
	Fast blue RR	B		
700	Nigrosine (soluble in water)		500	
	Nigrosine T	B		
705	Indamine 6R		2,800	
	Acid cyanine BF	A		
	Indocyanine B	A		
709	Pyrogene green 2G		6,503	
	Pryogene green 3G conc	I		
	Pyrogene green 3G	I		
726	Pyrogene blue		24,251	
	Pyrogene direct blue RL conc	I		
734	Pyrogene yellow		3,528	
	Pyrogene yellow O conc	I		
735	Pyrogene indigo	I	441	
746	Katigene green		11,397	13,638
	Thional brilliant green GG conc	S		
	Thional brilliant green GG	S		
	Katigene green 2G	By		
	Pyrogene blue green B conc	I		
748	Hydron blue (single strength)		39,723	40,287
	Hydron blue G 30 per cent paste	C		
	Hydron blue R 30 per cent paste	C		
	Hydron blue G powder	By		
	Hydron blue G powder	Q		
	Hydron blue R powder	By		
	Hydron blue G 100 per cent powder	C		
754	Kryogene violet 3RX	B	300	
759	Anthraflavone G paste, GC Paste, GC Pdr	B	20,594	
760	Indanthrene golden orange G (single strength)		73,305	131,401
	Indanthrene golden orange G paste	B		
	Indanthrene golden orange G double paste	B		
	Indanthrene golden orange G double paste fine	B		
	Indanthrene golden orange G paste sand free	B		
	Indanthrene golden orange G powder	B		
	Helindone golden orange IG double paste	M		
761	Indanthrene golden orange R		78,145	123,346
	Indanthrene golden orange RRT paste	B		
	Indanthrene golden orange RRT paste sand free	B		
	Indanthrene golden orange RRT paste fine	B		
	Helindone golden orange IRRT paste	M		
	Indanthrene golden orange RRT powder	B		
	Indanthrene golden orange 2R paste	Q		
	Indanthrene golden orange 3R paste	B		
762	Indanthrene scarlet GS powder	B	2,200	
763	Indanthrene dark blue BO paste		20	
	Helindone dark blue IBO paste	M		
765	Indanthrene green B paste		2,676	3,000
	Indanthrene blue green B double paste	B		
	Indanthrene green B double paste	B		
	Indanthrene green B double paste "fine"	B		
	Helindone blue green IB double paste	M		
766	Indanthrene violet R extra powder	B	249	

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
612	Quinoline yellow spirit soluble		10,653	$17,473
	Quinoline yellow conc	S.		
	Quinoline yellow soluble in spirit	By.		
	Quinoline yellow A soluble in spirit	B		
	Quinoline yellow conc	I.		
613	Quinoline yellow		6,955	12,723
	Quinoline yellow KT extra conc	By.		
	Quinoline yellow KT extra conc	B		
	Quinoline yellow N extra	By.		
	Quinoline yellow	By.		
617	Columbia yellow		3,652	4,041
	Chloramine yellow GG	By.		
	Diphenyl chlorine yellow FF supra 287	G		
	Diamine fast yellow B	C.		
618	Thioflavine T		6,765	16,502
	Thioflavine T	C.		
	Thioflavine T	S.		
	Thioflavine T	I.		
	Thioflavine TCN	C.		
620	Capri blue GON	L.	52	
621	Cresyl blue		104	306
	Cresyl blue 2RN	L.		
	Cresyl blue 2BS	L.		
	Brilliant cresyl blue 2B	B		
	Brilliant cresyl blue 2B	L.		
622	Delphine blue B		19,323	19,370
	Brilliant delphine blue B	S.		
	Brilliant delphine blue BS	S.		
	Brilliant delphine blue BS conc	S.		
	Brilliant delphine blue	S.		
624	Modern violet N		551	
	Modern violet N powder	DH.		
626	Gallocyanine		5,703	
	Brilliant chrome blue P	S.		
	Gallocyanine paste	S.		
627	Anthracyanine		330	
	Anthracyanine S powder	DH.		
	Anthracyanine S powder	Q.		
635	Modern violet		3,874	9,896
	Modern violet powder	DH.		
	Ultra violet MO	S.		
636	Prune		3,503	
	Prune pure S	S.		
637	Gallamine blue extra paste		29,237	
	Gallamine blue extra paste 900	G.		
641	Celestine blue B		44	
	Coreine RR powder No. 65	DH.		
649	Cotton blue		2,002	
	Meldola's blue 3R conc	S.		
653	Nile blue		823	
	Nile blue AX	M.		
	Nile blue BX	B.		
654	Nile blue 2BX	B.	111	
658	Fast black		1,500	1,767
	Gallophenine P	By.		
	Gallophenine D	By.		
	Gallophenine W	Q.		
659	Methylene blue		156	423
	Methylene blue	Q.		
	Methylene blue BG conc	B.		
	Toluidine blue	B.		
660	Methylene green		6,069	9,339
	Methylene green G	I.		
	Methylene green W 748	G.		
	Methylene green extra yellow	M.		
661	Thionine blue		2,746	5,049
	Thionine blue GO	M.		
	Thionine blue GO	I.		
	Thionine blue GO old	M.		
	Thionine blue GO old	Q.		
	Thionine blue GO conc	I.		
663	New methylene blue		2,060	
	New methylene blue N	C.		
667	Indochromine		1,249	3,616
	Indochromine T conc	S.		
	Indochromine T conc	I.		
	Brilliant alizarin blue G powder	By.		
668	Flavinduline O	B.	25	
669	Neutral violet D	M.	5	

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
808	Alizarin green S paste		10,281	$8,609
	Alizarin green S paste	B		
	Alizarin green CE	Q		
	Alizarin green V paste	By		
	Alizarin green 15 per cent paste	BAC		
810	Helindone yellow 3GN single strength		280	
	Helindone yellow 3GN powder	M		
811	Algol yellow 3G		5,000	
	Algol yellow 3G paste	By		
816	Algol red 5G single strength		1,134	
	Algol red 5G powder	By		
	Algol red 5G paste	By		
817	Algol yellow R (single strength)		1,721	
	Algol yellow R powder	By		
	Indra yellow GK paste	By		
819	Algol red R. FF (single strength)		14,825	21,614
	Algol red FF extra paste	By		
	Algol red R extra paste	By		
	Algol red R extra powder	By		
	Algol brilliant red 2B paste	By		
	Algol brilliant red 2B powder	By		
820	Algol brilliant violet R		8,241	
	Algol brilliant violet R paste	By		
	Algol brilliant violet R powder	By		
821	Algol brilliant violet 2B (single strength)		6,358	
	Algol brilliant violet 2B powder	By		
	Algol brilliant violet 2B paste	By		
822	Algol brilliant orange FR (single strength)		1,888	
	Algol brilliant orange FR powder	By		
823	Algol violet B paste	By	99	
824	Algol orange R (single strength)		2,730	
	Algol orange R powder	By		
	Algol orange R paste	By		
825	Algol red B		13,422	
	Algol red B paste	By		
	Algol red B powder	By		
827	Indanthrene claret B extra (single strength)		5,440	
	Indanthrene claret B extra paste	B		
830	Indanthrene red R (single strength)		888	
	Indanthrene red R paste	B		
831	Indanthrene red BN (single strength)		27,383	42,651
	Indanthrene red BN extra paste	B		
	Indanthrene red BN extra paste SF	B		
	Indanthrene red BN extra paste fine	B		
	Indanthrene red BN extra powder	B		
832	Indanthrene violet RN		1,000	
	Indanthrene violet RN extra paste fine	B		
833	Algol olive R (single strength)		1,464	
	Algol olive R powder	By		
834	Algol grey (single strength)		123	
	Algol grey B powder	By		
838	Indanthrene blue RS (single strength)		39,999	13,339
	Indanthrene blue RSP triple powder	B		
	Indanthrene blue RS powder	B		
	Indanthrene blue RSP powder	B		
	Indanthrene blue RS double paste	B		
	Indanthrene blue RS double paste	M		
	Indanthrene blue RS triple for paper	Q		
839	Algol blue K (single strength)		528	
	Algol blue K powder	By		
	Algol blue K paste	By		
840	Indanthrene blue 3G (single strength)		24,992	13,758
	Indanthrene blue 3G paste	B		
	Indanthrene blue 3G powder	B		
	Indanthrene blue 3GP powder	B		
	Indanthrene blue 3G double paste	B		
	Indanthrene blue 3G paste fine	B		
841	Indanthrene blue GGS (single strength)		2,830	2,439
	Indanthrene blue GGSP paste	B		
	Indanthrene blue GGSP double paste	B		
	Indanthrene GGSNP quintriple powder	B		
842	Indanthrene blue GCD (single strength)		16,862	13,604
	Indanthrene blue GCD double paste	B		
	Indanthrene blue GCD double paste	M		
	Indanthrene blue GCD double paste fine	B		
	Indanthrene blue GCD powder	B		
	Indanthrene blue GCD powder	Q		
843	Indanthrene blue CC paste		5,620	
	Indanthrene blue GC powder	B		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
844	Algol blue 3G (single strength)		5,315	
	Algol blue 3G powder	By		
	Algol blue 3G paste	By		
	Algol blue 3G	By		
847	Algol green B (single strength)		88	
	Algol green B powder	By		
848	Indanthrene grey BP (single strength)		20	
	Anthra grey B double paste	B		
849	Indanthrene yellow (single strength)		15,507	$5,322
	Indanthrene yellow GP powder	B		
	Indanthrene yellow G powder	B		
	Indanthrene yellow GN extra paste	B		
	Indanthrene yellow G paste	Q		
	Indanthrene yellow GN extra powder	B		
	Indanthrene yellow G double paste fine	B		
	Vat yellow R paste	Q		
	Helindone yellow IG	M		
	Helindone yellow IG double paste	M		
850	Indanthrene blue WB		3,261	
	Indanthrene blue WB powder	B		
	Indanthrene blue WBO powder	B		
851	Alizarin direct blue B	M	500	
852	Alizarin irisol DR		2,655	
	Alizarin irisol R powder	By		
	Alizarin direct violet R	M		
853	Anthraquinone violet powder	B	1,233	
854	Alizarin viridine DG, FF		25,910	
	Alizarin viridine FF paste	By		
855	Alizarin pure blue		14,993	55,614
	Alizarin sky blue	By		
	Alizarin sky blue B powder	By		
	Alizarin sky blue B conc	By		
856	Alizarin astrol		8,155	
	Alizarin astrol B powder	By		
858	Alizarin saphirol B		46,596	149,256
	Alizarin saphirol WSA powder	By		
	Alizarin saphirol WSA	B		
	Alizarin saphirol WSA	By		
	Alizarin saphirol WSA conc	By		
	Alizarin saphirol B powder	By		
	Alizarin saphirol B conc	By		
	Alizarin saphirol B	By		
	Alizarin saphirol SE powder	By		
	Alizarin saphirol SE conc	S		
	Alizarin saphirol SE conc. 75 per cent	By		
	Alizarin saphirol SE	By		
	Alizarin saphirol WS powder	By		
	Alizarin blue WS	By		
	Alizarin blue WSA	By		
	Alizarin light blue B	S		
	Alizarin light blue SE conc	S		
	Helio fast blue SL conc	By		
859	Cyananthrol R		949	
	Cyananthrol RXO powder	B		
	Cyananthrol RXO	B		
860	Cyananthrol G		20,648	61,200
	Cyananthrol BGAOO	B		
	Cyananthrol BGAOO, 90 per cent	B		
	Cyananthrol BGAOO powder	B		
	Cyananthrol 3G powder	B		
	Cyananthrol BGA powder	B		
	Cyananthrol BGA	B		
	Cyananthrol BGAC	B		
	Cyananthrol 3G	B		
861	Anthraquinone blue SR		711	
	Anthraquinone blue SR extra powder	B		
862	Alizarin blue black		22,277	25,536
	Alizarin blue black B powder	By		
	Alizarin blue black B powder	M		
	Alizarin blue black BT powder	B		
	Alizarin blue black B	By		
	Alizarin blue black B	Q		
	Alizarin blue black 3B	By		
	Alizarin blue black 3B powder	By		
863	Anthraquinone blue green		1,611	
	Anthraquinone blue green BXO	B		
	Anthraquinone blue green BXO powder	B		
864	Anthraquinone green GXNO		728	
	Anthraquinone green GXNO	B		
	Anthraquinone green GXNO	Q		
	Anthraquinone GXNO powder	B		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
865	Alizarin direct green G		11,669	$20,979
	Alizarin cyanine green G extra powder	By		
	Alizarin cyanine green G extra	By		
	Alizarin cyanine green G extra	Q		
	Alizarin cyanine green G extra paste	By		
	Alizarin cyanine green E powder	By		
	Alizarin cyanine green 3G powder	By		
	Alizarin cyanine green E powder	Q		
	Alizarin cyanine green 3G extra powder	By		
	Alizarin cyanine green GE	By		
	Alizarin direct green G	M		
867	Indanthrene brown (single strength)		11,860	
	Indanthrene brown B double paste	B		
	Anthra brown B double paste fine	B		
868	Cibanone brown V paste		3,717	3,276
	Cibanone brown B powder	I		
	Cibanone brown B paste 10 per cent	I		
	Cibanone brown V powder pat	I		
869	Algol brown B (single strength)		16,778	
	Algol brown R paste	By		
	Algol brown R powder	By		
870	Algol corinth R (single strength)		2,526	
	Algol corinth R powder	By		
	Algol corinth R paste	By		
873	Helindone brown AN (single strength)		25	
	Helindone brown AN paste	M		
874	Indigo, synthetic		505	
	Indigo LL powder	BAC		
	Indigo solution BASF 20 per cent	B		
879	Indigo R powder	M	10	
880	Indigo pure		62	28
	Indigo pure BASF/RBN powder	B		
	Indigo MLB/2B paste	M		
	Indigo MLB/4B powder	M		
881	Ciba blue 2B (single strength)		205,582	81,734
	Ciba blue 2BD paste 16 per cent pat	I		
	Ciba blue 2BD paste 16 per cent	I		
	Ciba blue 2BD paste pat	I		
	Ciba blue 2B powder	I		
	Ciba blue 2B powder pat	I		
882	Ciba blue G (single strength)		15,149	
	Ciba blue G powder	I		
	Ciba blue G powder pat	I		
883	Indigo KG (single strength)		3,711	
	Indigo 6B powder	M		
885	Brilliant indigo BD paste		4,541	
	Brilliant indigo B paste	B		
886	Brilliant indigo G paste	B	1,000	
887	Brilliant indigo 4G		431	
	Brilliant indigo 4G powder	B		
	Brilliant indigo 4G paste	B		
890	Ciba yellow G		931	
	Ciba yellow G 10 per cent paste pat	I		
	Ciba yellow G 10 per cent paste	I		
891	Ciba green		5,844	
	Ciba green G paste 10 per cent pat	I		
892	Helindone green G		658	
	Helindone green G paste	M		
	Helindone green G extra paste	Q		
	Helindone green G powder	M		
893	Alizarin indigo G		5,000	
	Alizarin indigo G paste	By		
894	Alizarin indigo B		1,250	
	Alizarin indigo B paste	By		
	Alizarin indigo green B paste	By		
895	Alizarin indigo 3R		4,305	
	Alizarin indigo 3R paste	By		
	Alizarin indigo 3R powder	By		
899	Ciba grey		220	
	Ciba grey G paste	I		
901	Ciba violet B (single strength)		131,661	64,725
	Ciba violet R powder pat	I		
	Ciba violet B powder pat	I		
	Ciba violet R paste 10 per cent pat	I		
	Ciba violet B paste 10 per cent	I		
902	Helindone brown 2R (single strength)		3,511	
	Helindone brown 2R powder	M		
	Helindone brown 2R powder	Q		
	Helindone brown 2R paste	M		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
904	Helindone brown G (single strength)		4,016	$6,178
	Helindone brown G powder	M		
	Helindone brown G powder	Q		
	Helindone brown G paste	M		
	Helindone brown CR paste	M		
	Thio indigo brown G paste	K		
906	Thio indigo scarlet G (single strength)		7,733	
	Ciba red G powder	I		
	Ciba red G powder pat	I		
	Ciba red G paste	I		
907	Ciba scarlet (single strength)		33,246	55,202
	Ciba scarlet G extra paste 20 per cent pat	I		
	Ciba scarlet G extra paste	I		
	Ciba scarlet G extra powder	I		
	Thio indigo scarlet 2G	K		
	Thio indigo scarlet 2G paste 17 per cent	K		
	Thio indigo scarlet 2G paste 20 per cent	K		
	Helindone fast scarlet C paste	M		
908	Ciba red R paste		25,188	17,695
	Ciba red R powder	I		
	Ciba red R paste 20 per cent pat	I		
	Ciba red R paste 20 per cent	I		
	Ciba red R paste 10 per cent pat	I		
910	Helindone pink (single strength)		48,633	58,319
	Helindone pink BN paste	M		
	Helindone rose AN paste	M		
	Helindone pink AN extra	M		
	Helindone pink AN	M		
	Helindone pink BN	M		
	Helindone pink AN extra	M		
	Thio indigo pink AN paste	K		
	Thio indigo rose BN extra paste	K		
	Thio indigo pink BN paste	K		
911	Ciba orange G paste 10 per cent pat	I	110	
913	Helindone orange R (single strength)		9,240	
	Helindone orange R powder	M		
	Helindone orange R paste	M		
914	Helindone orange D paste	M	25	
915	Helindone fast scarlet R paste	M	2,929	
917	Helindone red B paste	M	1,651	
918	Helindone red 3B (single strength)		32,819	54,138
	Helindone red 3B paste	M		
	Indanthrene red violet RH paste	M		
	Helindone red 3B powder	By		
	Thio indigo red 3B paste	K		
919	Ciba bordeaux B (single strength)		33,621	
	Ciba bordeaux B powder pat	I		
	Ciba bordeaux B paste	I		
920	Helidone violet (single strength)		1,707	3,787
	Helindone violet R paste	M		
	Helindone violet B paste	M		
	Helindone violet R powder	M		
922	Diphenyl black base	M	200	
923	Ursol		1,105	2,116
	Ursol A	A		
	Ursol 4R	A		
	Ursol grey G	A		
	Ursol grey B	A		
	Ursol grey ALA	A		
	Ursol D F	A		
	Fur gray ALA	A		
	Fuscamine G	B		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

Schultz No.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
865	Alizarin direct green G		11,669	$3,979
	Alizarin cyanine green G extra powder	By		
	Alizarin cyanine green G extra	By		
	Alizarin cyanine green G extra	Q		
	Alizarin cyanine green G extra paste	By		
	Alizarin cyanine green E powder	By		
	Alizarin cyanine green 3G powder	By		
	Alizarin cyanine green E powder	Q		
	Alizarin cyanine green 3G extra powder	By		
	Alizarin cyanine green GE	By		
	Alizarin direct green G	M		
867	Indanthrene brown (single strength)		11,860	
	Indanthrene brown B double paste	B		
	Anthra brown B double paste fine	B		
868	Cibanone brown V paste		3,717	1,25
	Cibanone brown B powder	I		
	Cibanone brown B paste 10 per cent	I		
	Cibanone brown V powder pat	I		
869	Algol brown B (single strength)		16,778	
	Algol brown R paste	By		
	Algol brown R powder	By		
870	Algol corinth R (single strength)		2,526	
	Algol corinth R powder	By		
	Algol corinth R paste	By		
873	Helindone brown AN (single strength)		25	
	Helindone brown AN paste	M		
874	Indigo, synthetic		505	
	Indigo LL powder	BAC		
	Indigo solution BASF 20 per cent	B		
879	Indigo R powder	M	10	
880	Indigo pure		62	3
	Indigo pure BASF/RBN powder	B		
	Indigo MLB/2B paste	M		
	Indigo MLB/4B powder	M		
881	Ciba blue 2B (single strength)		205,882	91,79
	Ciba blue 2BD paste 16 per cent pat	I		
	Ciba blue 2BD paste 16 per cent	I		
	Ciba blue 2BD paste pat	I		
	Ciba blue 2B powder	I		
	Ciba blue 2B powder pat	I		
882	Ciba blue G (single strength)		15,149	
	Ciba blue G powder	I		
	Ciba blue G powder pat	I		
883	Indigo KG (single strength)		3,711	
	Indigo 6B powder	M		
885	Brilliant indigo BD paste		4,541	
	Brilliant indigo B paste	B		
886	Brilliant indigo G paste	B	1,000	
887	Brilliant indigo 4G		431	
	Brilliant indigo 4G powder	B		
	Brilliant indigo 4G paste	B		
890	Ciba yellow G		931	
	Ciba yellow G 10 per cent paste pat	I		
	Ciba yellow G 10 per cent paste	I		
891	Ciba green		5,844	
	Ciba green G paste 10 per cent pat	I		
892	Helindone green G		658	
	Helindone green G paste	M		
	Helindone green G extra paste	Q		
	Helindone green G powder	M		
893	Alizarin indigo G		5,000	
	Alizarin indigo G paste	By		
894	Alizarin indigo B		1,250	
	Alizarin indigo B paste	By		
	Alizarin indigo green B paste	By		
895	Alizarin indigo 3R		4,305	
	Alizarin indigo 3R paste	By		
	Alizarin indigo 3R powder	By		
899	Ciba grey		220	
	Ciba grey G paste	I		
901	Ciba violet B (single strength)		131,661	64,72
	Ciba violet R powder pat	I		
	Ciba violet B powder pat	I		
	Ciba violet R paste 10 per cent pat	I		
	Ciba violet B paste 10 per cent	I		
902	Helindone brown 2R (single strength)		3,511	
	Helindone brown 2R powder	M		
	Helindone brown 2R powder	Q		
	Helindone brown 2R paste	M		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

ults o.	Dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
904	Helindone brown G (single strength)		4,016	$6,178
	Helindone brown G powder	M		
	Helindone brown G powder	Q		
	Helindone brown G paste	M		
	Helindone brown CR paste	M		
	Thio indigo brown G paste	K		
906	Thio indigo scarlet G (single strength)		7,733	
	Ciba red G powder	I		
	Ciba red G powder pat	I		
	Ciba red G paste	I		
907	Ciba scarlet (single strength)		33,246	55,202
	Ciba scarlet G extra paste 20 per cent pat	I		
	Ciba scarlet G extra paste	I		
	Ciba scarlet G extra powder	I		
	Thio indigo scarlet 2G	K		
	Thio indigo scarlet 2G paste 17 per cent	K		
	Thio indigo scarlet 2G paste 20 per cent	K		
	Helindone fast scarlet C paste	M		
908	Ciba red R paste		25,188	17,695
	Ciba red R powder	I		
	Ciba red R paste 20 per cent pat	I		
	Ciba red R paste 20 per cent	I		
	Ciba red R paste 10 per cent pat	I		
910	Helindone pink (single strength)		48,633	58,319
	Helindone pink BN paste	M		
	Helindone rose AN paste	M		
	Helindone pink AN extra	M		
	Helindone pink AN	M		
	Helindone pink BN	M		
	Helindone pink AN extra	M		
	Thio indigo pink AN paste	K		
	Thio indigo rose BN extra paste	K		
	Thio indigo pink BN paste	K		
911	Ciba orange G paste 10 per cent pat	I	110	
913	Helindone orange R (single strength)		9,240	
	Helindone orange R powder	M		
	Helindone orange R paste	M		
914	Helindone orange D paste	M	25	
915	Helindone fast scarlet R paste	M	2,929	
917	Helindone red B paste	M	1,651	
918	Helindone red 3B (single strength)		32,819	54,138
	Helindone red 3B paste	M		
	Indanthrene red violet RH paste	M		
	Helindone red 3B powder	By		
	Thio indigo red 3B paste	K		
919	Ciba bordeaux B (single strength)		33,621	
	Ciba bordeaux B powder pat	I		
	Ciba bordeaux B paste	I		
920	Helidone violet (single strength)		1,707	3,787
	Helindone violet R paste	M		
	Helindone violet B paste	M		
	Helindone violet R powder	M		
922	Diphenyl black base	M	200	
923	Ursol		1,105	2,116
	Ursol A	A		
	Ursol 4R	A		
	Ursol grey G	A		
	Ursol grey B	A		
	Ursol grey ALA	A		
	Ursol D F	A		
	Fur gray ALA	A		
	Fuscamine G	B		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED ACID DYES.

Dye.	Manufacturer.	Imports	
		Quantity.	Invoice value
		Pounds.	
Acid alizarin gray G	M	7,555	
Acid ponceau E 640	G	685	
Acid pure blue R supra 614	G	5,130	
Acid rhodamine	I	13,275	[illegible]
Acid rhodamine R	I		
Acid rhodamine R conc	I		
Acid rhodamine BG	B		
Acid rhodamine 3R conc	I		
Acid violet 4RNOO	B	300	
Alizarin cyanol		130	
Alizarin cyanole 8B	C		
Alizarin cyanole 8R	C		
Alizarin delphinol BS	BD	1,200	
Alizarin direct violet ER	B	120	
Alizarin emeraldole G powder	By	536	
Alizarin rubinol		26,457	[illegible]
Alizarin rubinol GW	Q		
Alizarin rubinol R	By		
Alizarin rubinol R powder	By		
Alizarin rubinol 5G powder	By		
Alizarin rubinol 3G powder	By		
Alizarin rubinol R conc. 40-100	By		
Alizarin rubinol GW powder	By		
Alizarin rubinol B powder	By		
Alizarin rubinol	Q		
Alizarin rubinol GW powder 100 per cent	Q		
Alizarin rubinol GW	By		
Alizarin rubinol powder 3G	Q		
Alizarin rubinol R	By		
Alizarin rubinol R	B		
Alizarin rubinol GW	Q		
Alizarin uranole 2B powder	By	577	
Alkali fast green 3G	By	613	
Alphanol brown B	C	100	
Anthosine		2,564	
Anthosine 5B	B		
Anthosine 3B	B		
Azo acid black B	M	400	
Azo rhodine 2GN conc	I	441	
Biebrich acid violet 7B	K	100	
Blue BSJ	GrE	503	
Brilliant milling blue		872	
Brilliant milling blue 41424	K		
Brilliant milling blue B	C		
Brilliant pure yellow 6G extra	By	2,733	
Cloth fast green		3,536	
Cloth fast green G conc	I		
Cloth fast green B conc	I		
Cloth fast orange		991	2,69
Cloth fast orange R conc	I		
Cloth fast orange R conc. pat	I		
Cloth fast orange G conc	I		
Cloth fast red		690	91
Cloth fast red GR	I		
Cloth fast red GR conc	I		
Cloth fast red 3B conc	I		
Cloth fast violet		1,582	3,93
Cloth fast violet R conc	I		
Cloth fast violet R conc. pat	I		
Cloth fast violet B conc	I		
Cloth fast yellow		220	
Cloth fast yellow G conc	I		
Cyanine green G extra powder	By	1,499	
Erio carmine 2BC 512	G	3,109	
Erio fast cyanine SE 676	G	440	
Erio fast fuchsine BBL 649	G	2,999	
Erio fast yellow R conc. 593	G	110	
Erio rubine 2B conc. 646	G	699	
Erio violet BC 505	G	2,500	
Fast acid marine blue		1,040	
Fast acid marine blue HBBX	B		
Fast acid marine blue HBBX	Q		
Fast acid purple A	BD	50	
Fast red GL base	GrE	50	

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED ACID DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
ue BL 50: 100 conc	By	9'6	
ed BL	A	200	
conc	I	1,323	
d		1,212	
t red R conc	I		
t red R	I		
llow		46,753	
t yellow R conc	I		
t yellow 3G conc	I		
		5,402	
1 G. conc	I		
1 S	I		
		3,086	
llow S	I		
llow S conc	I		
patent LE	C	1,320	
black ABP	P	50	
blue black P	P	50	
blue JEF	K	250	
t yellow		618	$1,124
light yellow RX	B		
light yellow BX	B		
light yellow	Q		
VC 680	G	7,312	
		1,329	
nge R conc. 599	G		
nge RC 599	G		
		14,926	16,898
R conc. 597	G		
G. conc. 596	G		
RS conc. 606	G		
red shade	G		
B conc. 603	G		
blue shade	G		
2G conc. 602	G	2,998	
GXF	K	1,604	
	S	500	
blue	C	451	
nine OR extra	By	1	
lack BR	By	249	
rown		252	
ne brown R	By		
ne brown R	B		
d 2G	By	6	
ellow		1,307	
ne yellow R	By		
ne yellow R	K		
ne yellow R	B		
ne yellow R	Q		
y blue B	By	271	
e 10 per cent patent	I	1,323	
		200	
ck N	M		
ck N	Q		
ue	By	10,568	18,014
blue BL	By		
blue GL	By		
blue BQ	B		
blue BL double conc	By		
blue BL	O		
low 3G	B	100	

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED MORDANT AND CHROME DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
Anthrazurine G	K	200	
Brilliant alizarin green A	RHS	10	
Chromacetine blue S powder	DH	441	
Chromate brown G conc	I	198	
Chromazurine		4,589	$15,730
Chromazurine P powder	DH		
Chromazurine E powder	DH		
Chromazurine G powder	DH		
Chromazurine G	I		
Chromazurine G powder	I		
Chrome brilliant blue G 1039	G	392	
Chrome fast brown		4,200	
Chrome fast brown TV conc	I		
Chrome fast brown TV	I		
Chrome fast violet B conc	I	1,276	
Chrome printing red G powder	DH	100	
Chrome yellow CR 1037	G	110	
Chromorhoduline		440	1,452
Chromorhoduline 6GN powder	DH		
Chromorhoduline BN powder	DH		
Chromorhoduline 6GN extra	DH		
Chromoxane blue R	By	1	
Chromoxane brilliant blue		2,256	
Chromoxane brilliant blue	By		
Chromoxane brilliant blue G	By		
Eriochrome black		5,366	4,084
Eriochrome black	G		
Eriochrome black E 965	G		
Eriochrome blue S 955	G	2,500	
Eriochrome bordeaux B 916	G	1,168	
Eriochrome brown ROS 933	G	17,555	
Eriochrome flavine A conc. 1015	G	12,200	
Eriochrome geranol R conc. 991	G	1,206	
Eriochrome green 0.931	G	1,109	
Eriochrome red		5,714	
Eriochrome red G 978	G		
Eriochrome red PEI 1035	G		
Eriochrome violet		7,997	8,132
Eriochrome violet B 918	G		
Eriochrome violet 3B 941	G		
Eriochrome yellow 6G 914	G	1,109	
Fast chrome green			
Fast chrome green B powder	DH	440	
Fast chrome green B powder	Q		
Fast mordant blue B	M	1,151	
Lanasol blue		10,006	
Lanasol blue B	I		
Lanasol blue B patent	I		
Lanasol brown 2R type patent	I	772	
Lanasol orange		2,645	5,070
Lanasol orange G conc. patent	I		
Lanasol orange 2R conc. patent	I		
Leather black BC	Q	84	
Metachrome blue black 2BX	A	3,251	
Metachrome olive 2G	A	610	
Metachrome olive brown		5,070	
Metachrome olive brown G powder	A		
Metachrome olive brown G powder	Q		
Metachrome olive brown G paste	A		
Modern black N powder	DH	110	
Modern grey		220	
Modern grey CVX powder	DH		
Modern grey RC powder	DH		
Monochrome brown		4,382	5,198
Monochrome brown E 286 per cent	K		
Monochrome brown E 100 per cent	K		
Monochrome brown BX	By		
Mounsey olive brown G powder	Q	500	
Naphthachrome azurine		2,335	
Naphthachrome azurine B	I		
Naphthachrome azurine B conc	I		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED MORDANT AND CHROME DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
hrome brown		8,570	$10,224
ga chrome brown G conc.	I.		
ga chrome brown PB conc.	S.		
ga chrome brown P conc.	S.		
ga chrome red B conc.	S.		
ga chrome brown PB	S.		
hrome violet		319	
ito chrome violet R conc.	I.		
ito chrome violet R	I.		
hrome red B conc.	S.	1,001	
e for printing	I.	2,205	
Bordeaux RF	K	300	
range 2R	K	400	
ed G	K	85	
rine green in balls	Q	220	
UNIDENTIFIED DIRECT DYES.			
ne blue RN conc.	I.	220	
rdeaux 6B	By.	415	
onze E	By.	110	
rome black blue B	By.	513	
rome brown		3,197	
o chrome brown G	Q		
o chrome brown 5G	By.		
pper blue 2B	By.	1,391	
rk brown extra	By.	1,100	
st black		2,989	
o fast black L	Q		
o fast black L	By.		
st blue		1,771	4,195
o fast blue EFL	By.		
o fast blue G	By.		
o fast blue L	By.		
st bordeaux		2,765	
o fast Bordeaux 6BL	By.		
o fast Bordeaux 6BL	Q		
st brown		3,547	4,133
o fast brown GL	By.		
o fast brown 3GL	By.		
o fast brown 3GL 90 per cent	By.		
o fast brown RL	By.		
st grey	By.	220	
st heliotrope		12,407	26,960
o fast heliotrope BL	By.		
o fast heliotrope 2RL	By.		
o fast heliotrope 4BL	By.		
iant benzo fast violet B	K		
iant benzo fast violet B	Q		
iant benzo violet B	By.		
iant benzo fast violet BL conc. 50 per cent	By.		
iant benzo fast violet BL	By.		
iant benzo fast violet 2R	K		
iant benzo fast violet 2RL	By.		
st orange 2RL	By.	769	
st rubine BL	By.	209	
ht blue 4GL	By.	275	
ht Bordeaux 6BL	By.	53	
ht brown		888	1,229
o light brown GL	By.		
o light brown 2GL	By.		
o light brown 3GL	By.		
ht grey BL	By.	1,342	
ht yellow RL	By.	441	
d 12B	By.	8,053	
oduline red		2,702	
o rhoduline red B	By.		
o rhoduline red 3B	By.		
benzo green B	By.	1,561	
benzo violet		965	
iant benzo violet 2R	By.		
iant benzo violet B	By.		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
Brilliant copper blue GW	A	100	
Brilliant dianil green G	M	1	
Brilliant fast blue		3,862	$11,250
Brilliant fast blue B	By		
Brilliant fast blue 3BX	By		
Brilliant fast blue 2G, 60 per cent	By		
Brilliant fast blue 2G	By		
Brilliant fast blue 2G	Q		
Brilliant fast blue 2G	L		
Brilliant indigo 4B powder	Q	2	
Brilliant sky blue 8G extra	By	7,490	
Chicago red III	G	5,104	
Chloramine brilliant red		4,914	13,273
Chloramine brilliant red 8B	S		
Chloramine brilliant red 8B	I		
Chloramine brilliant red 8B conc	S		
Chloramine brilliant red 8BI conc	S		
Chloramine brown G	By	262	
Chlorantine fast black B conc	I	1,322	
Chlorantine fast blue		12,898	
Chlorantine fast blue 2GL conc	I		
Chlorantine fast Bordeaux		7,827	24,479
Chlorantine fast Bordeaux BL conc	I		
Chlorantine fast Bordeaux 2BL conc	I		
Chlorantine fast Bordeaux 2BL	I		
Chlorantine fast brown		7,715	11,897
Chlorantine fast brown RL	I		
Chlorantine fast brown RL pat	I		
Chlorantine fast brown 3GL	I		
Chlorantine 3GL conc	I		
Chlorantine fast brown 3GL conc. pat	I		
Chlorantine fast orange TRL	I	1	
Chlorantine fast red		11,022	
Chlorantine fast red 7BL	I		
Chlorantine fast red 7BL conc	I		
Chlorantine fast rubine		4,299	
Chlorantine fast rubine RL	I		
Chlorantine fast rubine RL conc. pat	I		
Chlorantine fast violet		18,188	47,530
Chlorantine fast violet BL	I		
Chlorantine fast violet BL conc	I		
Chlorantine fast violet BL conc. pat	I		
Chlorantine fast violet 4BL conc	I		
Chlorantine fast violet 4BL	I		
Chlorantine fast violet 4BL conc. pat	I		
Chlorantine fast violet 2RL	I		
Chlorantine fast violet 2RL pat	I		
Chlorantine fast violet 2RL conc. pat	I		
Chlorantine fast yellow		9,898	27,831
Chlorantine fast yellow 4GL conc	I		
Chlorantine fast yellow RL	I		
Chlorantine fast yellow RL conc	I		
Chlorazol fast black N	BD	50	
Chlorazol fast red K	BD	500	
Chlorazol violet R	BD	300	
Chromanil black BF	A	1,000	
Chromopurpurine JJ powder	DH	110	
Cotton pink		75	184
Cotton pink GN	B		
Cotton pink BN	B		
Cotton pink B extra	B		
Cupranil brown		2,975	
Cupranil brown G conc	I		
Cupranil brown R conc	I		
Cutch brown RR conc	S	2,901	
Diamine azo Bordeaux B	C	1,500	
Diamine azo orange 2R	C	363	
Diamine brilliant rubine S	C	1,005	
Diamine brilliant scarlet S	C	4,152	
Diamine catechine		9,418	15,253
Diamine catechine GR conc	C		
Diamine catechine B	C		
Diamine catechine G	C		
Diamine catechine 3G	C		
Diamine catechine G 160 per cent	C		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
Diamine dark blue B	C	57	
Diamine fast black		4,000	
Diamine fast black X	C		
Diamine fast black XN	C		
Diamine fast blue		5,040	
Diamine fast blue FFB	C		
Diamine fast blue GC	C		
Diamine fast Bordeaux 6BS	C	1,219	
Diamine fast brown		3,187	$3,471
Diamine fast brown R	C		
Diamine fast brown G	C		
Diamine fast brown GB	C		
Diamine fast brown 3G	C		
Diamine fast orange		8,719	10,245
Diamine fast orange ER	Q		
Diamine fast orange ER	By		
Diamine fast orange ER	C		
Diamine fast orange EG	C		
Diamine fast rose BBF	C	112	
Diamine heliotrope G	C	441	
Diamine orange		1,323	1,456
Diamine orange B	C		
Diamine orange F	C		
Diamine orange G	C		
Diaminogene sky blue		2,924	
Diaminogene sky blue 3B	C		
Diaminogene sky blue N	C		
Dianil brown		1,150	
Dianil brown 3GO	K		
Dianil chrome brown G	Q		
Dianil fast blue GL	M	1	
Dianil fast grey BBL	M	1	
Diazamine blue		11,378	
Diazamine blue BR conc	S		
Diazamine blue BR	S		
Diazanil pink B	M	110	
Diazanil scarlet 4BA	M	1,000	
Diazo blue B	K	1,380	
Diazo Bordeaux		2,451	
Diazo Bordeaux	By		
Diazo Bordeaux 7B	By		
Diazo brilliant green		859	
Diazo brilliant green 3G	By		
Diazo brilliant green 3G	K		
Diazo brilliant orange		734	1,401
Diazo brilliant orange GR extra	By		
Diazo brilliant orange 5G extra	By		
Diazo brilliant orange G	Q		
Diazo brilliant red B	By	1,100	
Diazo brilliant scarlet		10,913	31,508
Diazo brilliant scarlet B	By		
Diazo brilliant scarlet B extra	By		
Diazo brilliant scarlet 8 4B	By		
Diazo brilliant scarlet 2BL extra conc	By		
Diazo brilliant scarlet G extra	By		
Diazo brilliant scarlet 2BL extra	By		
Diazo brilliant scarlet 5BL extra	By		
Diazo brilliant scarlet 6B extra	By		
Diazo brilliant scarley 6B extra	B		
Diazo brilliant scarlet 6B extra	Q		
Diazo brown		1,744	2,591
Diazo brown 3G	By		
Diazo brown NR	By		
Diazo brown 3RB	By		
Diazo fast bordeaux BL	By	538	
Diazo fast green BL	By	22	
Diazo fast violet		815	
Diazo fast violet BL	By		
Diazo fast violet 3RL	By		
Diazo fast yellow		129	
Diazo fast yellow 2G	By		
Diazo fast yellow G	By		
Diazogene orange		125	
Diazogene orange GR extra	K		
Diazogene orange GR	K		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
Diazogene red B	K	300	
Diazo geranine B extra	By	143	
Diazonine blue B	By	220	
Diazo indigo blue		841	$1,423
Diazo indigo blue 4GL extra	By		
Diazo indigo blue 4GL extra	Q		
Diazo indigo blue M	By		
Diazo light green BL	By	198	
Diazo light violet BL	By	126	
Diazo phenyl black		6,172	
Diazo phenyl black V 360	G		
Diazo phenyl black 360	G		
Diazo rubine B	By	2,358	
Diazo sky blue		14,067	17,854
Diazo sky blue B	By		
Diazo sky blue B	Q		
Diazo sky blue B	K		
Diazo sky blue B powder	By		
Diazo sky blue 3G	By		
Diazo violet R	By	84	
Diphenyl dark green BC 235	G	2,500	
Diphenyl fast blue FB supra 379	G	1,609	
Diphenyl fast gray		610	
Diphenyl fast gray BC 254	G		
Diphenyl fast gray BC 254	Y		
Direct blue 8B	L	10	
Direct catechine GR conc	I	794	
Direct chrome brown B	L	50	
Direct clear blue FF	L	10	
Direct fast red 8BL	L	225	
Direct fast violet B	L	10	
Direct red 8B	L	25	
Direct safranine RW conc	I	500	
Fast cotton red 4BS extra	L	25	
Indigene blue FBW conc	I	1,102	
Naphthamine blue		5,129	
Naphthamine blue JE 58.8 per cent	K		
Naphthamine blue JE 52.5 per cent	K		
Naphthamine fast black		550	
Naphthamine fast black KSG extra	K		
Naphthamine fast black KSV extra	K		
Naphthamine fast blue B pat	K	250	
Naphthamine fast brown BL	K	220	
Naphthamine fast green		630	
Naphthamine fast green Y	K		
Naphthamine fast green G	K		
Naphthamine fast gray B	K	325	
Naphthamine fast violet FB	K	50	
Naphthamine light blue		375	724
Naphthamine light blue R	K		
Naphthamine light blue 4B	K		
Naphthamine light blue FF	K		
Naphthamine light blue B	K		
Naphthamine light blue 2B	K		
Naphthamine light brown		1,125	
Naphthamine light brown D	K		
Naphthamine light brown 2G	K		
Naphthamine light green G	K	125	
Naphthamine light orange L	K	100	
Naphthamine light red		750	
Naphthamine light red R	K		
Naphthamine light red 6B	K		
Naphthamine light violet 2B	K	625	
Naphthogene blue		8,709	14,128
Naphthogene blue B	A		
Naphthogene blue 2R	A		
Naphthogene blue 4R	A		
Naphthogene indigo blue B	A	25	
Oxamine acid brown G	B	3,000	
Oxamine black		600	
Oxamine black BBNX	B		
Oxamine black RX	B		
Oxamine brilliant violet BX	B	1	
Oxamine fast pink		217	
Oxamine fast pink BX	B		
Oxamine fast pink BX conc	B		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
light blue G	B	110	
light brown G	B	500	
inogene ED	C	200	
2RX	By	10	
wn V extra	By	100	
ck		1,084	$897
black A extra	By		
black A	By		
black G	By		
wn		2,696	1,622
brown GG	By		
brown 2G	By		
brown R	By		
nyl blue		2,402	
phenyl blue GC 103	G		
phenyl blue GNH conc. 376	G		
nyl yellow RC 115	G	1,797	
e orange R	B	220	
ast brown		3,553	
zol fast brown B	S		
ol fast brown D	D		
rene		7,823	25,886
anthrene R	I		
anthrene R conc. pat	I		
anthrene GWL extra	I		
anthrene RN conc. pat	I		
anthrene BN conc	I		
anthrene RN conc	I		
anthrene B conc. pat	I		
anthrene B conc	I		
rene Bordeaux		5,179	19,674
anthrene Bordeaux B conc. pat	I		
antherne Bordeaux B conc	I		
anthrene fast red 7BL	I		
anthrene fast red 7BL conc	I		
rene fast Bordeaux		1,431	4,225
anthrene fast Bordeaux 2BL conc	I		
anthrene fast Bordeaux BN pat. conc	I		
anthrene fast Bordeaux RN pat. conc	I		
anthrene fast Bordeaux	I		
hrene orange		1,806	
anthrene orange R conc. pat	I		
anthrene orange R conc	I		
anthrene orange R pat	I		
hrene rose		1,118	
anthrene rose	I		
anthrene rose conc. pat	I		
ne blue FF	A	500	
ne brown	Q	122	
ne red RXX	B	10	
orange G conc	I	2,822	
hon bronze B conc	S	2,002	
si black		3,000	1,525
mbesi black D	A		
mbesi black F	A		
mbesi black V	A		

UNIDENTIFIED SULPHUR DYES.

ye green		27,834	$26,321
ss dye green B	BD		
ss dye green 2G conc	BD		
brown		35,991	16,689
ipse brown 3G K 366	G		
ipse brown 3G K 366	I		
ipse brown BK 371	I		
ipse brown BK 371	Y		
ipse brown BK 371	G		
al brilliant green G extra 300 per cent	C	2	
al direct blue B	C	551	
al indigene GCL conc	C	200	
al violet C	C	600	

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED SULPHUR DYES—Continued.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
Katigene kaki G extra	By	551	
Katigene brilliant green 3G	By	441	
Pyrogene brown RS yellow shade conc	I	1,243	
Pyrogene cutch 2R extra conc	I	551	
Pyrogene cutch brown 2R extra	I	1,146	
Pyrogene violet brown X conc	I	1,102	
Pyrogene yellow brown RS conc	I	2,756	
Sulphur green		24,872	
Sulphur green B	BD		
Sulphur green 2G conc	BD		
Thiogene brown GR	M	7,560	
Thiogene new blue		1,136	
Thiogene new blue 2RL	M		
Thiogene new blue 2RL conc	M		
Thiogene new blue 2 L extra conc	M		
Thionone black 6R	RHS	100	
Thional brilliant blue		3,757	
Thional brilliant blue 6B conc	S		
Thional brilliant blue 6B conc	I		
Thional brilliant green		3,647	
Thional brilliant green GG conc	S		
Thional green GG	S		
Thional brown		48,750	$25,28
Thionol brown Q	BD		
Thionol brown GD	BD		
Thionol brown R	BD		
Thionol green DY	BD	3,891	
Thionol orange G	S	2,121	
Thionol yellow		26,682	
Thionol yellow 3RD	BD		
Thionol yellow GR	BD		
Thionone Isabellina	Q	100	

UNIDENTIFIED BASIC DYES.

Acridine fast blue FFB	CJ	330	
Blue brilliant pure 8G extra	By	152	
Brilliant rhoduline blue		2,991	
Brilliant rhoduline blue R	By		
Brilliant rhoduline blue R	Q		
Brilliant rhoduline red B	By	295	
Brilliant violet R paste 1:8	By	624	
Cresyl fast violet		26	
Cresyl fast violet BB	L		
Isamine blue		211	75
Isamine blue 8B	K		
Isamine blue R	K		
Isamine blue R	C		
Janus black G	M	1	
Methylene green IA	M	4	
New ethyl blue BS	M	120	
Rhodamine		2,822	13,36
Rhodamine 6 GH conc	I		
Rhodamine 6GH	I		
Rhodamine 6GH extra	I		
Rhoduline sky blue 3G	By	697	
Saffranine T. S. extra highly conc	B	1	
Solid Bordeaux BL	By	783	
Thionine blue gold	M	50	
Thionine green GG	Q	2,650	
Violet		550	
Violet PDH powder	DH		
Violet PDN powder	DH		

TABLE 15.—*Imports of dyes, calendar year 1922*—Continued.

UNIDENTIFIED SPIRIT-SOLUBLE AND COLOR-LAKE DYES.

Dye.	Manufacturer.	Imports.	
		Quantity.	Invoice value.
		Pounds.	
e 23211 powder	B	1	
S	B	15	
i G Pdr	M	100	
ie G	M	25	
aux		5,600	
ordeaux BL powder	By		
ordeaux BL paste	By		
ordeaux BL paste 1:5	By		
olet AL	By	740	
ie RW conc	I	110	
range		1,400	
ast orange R powder	B		
ast orange B powder	B		
ellow GG extra lumps	B	500	
ie 3B powder	B	20	
wder	B	25	
		60	
w R	B		
w R powder	B		
le in spirit	B	10	
e S	K	25	
lack FB	B	5	
ellow FR	B	50	
UNIDENTIFIED, UNCLASSIFIED, SPECIAL DYES.			
lline dyes			$2,074
k black G conc. 50-100	Q	220	
for laundry	B	400	
		6,105	12,735
BITN	GrE		
special	I		
special	Q		
blue S	By	399	
		851	866
lack extra	B		
lack extra	Q		
lack MBG	B		
		330	
blue B conc	I		
blue G conc	I		
n B conc	I	110	
B conc	I	110	
B	I	220	
t R	I	220	
w		440	
yellow G conc	I		
yellow R conc	I		
RX	B	150	
	B	200	
ordeaux B	By	3,003	
k	A	1,000	
w R	C	20	
	C	20	
n		40	
rown B	C		
rown S	C		
		40	
lack SB	C		
lack ST	C		
rown B powder	GrE	20	
lue B powder	GrE	20	
range RG paste	GrE	10	
ed		60	70
ast red B paste	GrE		
ast red BB paste	GrE		
ast red GL paste	GrE		
ast red GE paste	GrE		
ast red GZ paste	GrE		
e	Q	441	

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Aceto purpurine 8B	358	76
Acid alizarin black R	159	75
Acid alizarin gray G		88
Acid anthracene red 5BL	400	76
Acid blue RBF	562	79
Acid brown RN	212	75
Acid chrome blue 2R		91
Acid cyanine BF	705	82
Acid magenta	524	78
Acid milling black B	265	75
Acid milling red G	293	75
Acid ponceau E		88
Acid pure blue R		88
Acid rhodamine BG		88
Acid rhodamine R		88
Acid rhodamine 3R		88
Acid violet 4BN	527	78
Acid violet 4BNS	527	78
Acid violet N	527	78
Acid violet 6BN	518	79
Acid violet 4RNOO		88
Acid violet 7B (B)	534	78
Acridine orange	603	80
Acridine fast blue FFB		98
Acridine red B, 3B	599	79
Acridine yellow, R, G	602	80
Azalma black 10B	217	75
Algol blue 3G	844	83
Algol blue K	839	84
Algol brilliant orange FR	822	84
Algol brilliant red 2B	819	84
Algol brilliant violet 2B	821	84
Algol brilliant violet R	820	84
Algol brown G		90
Algol brown R	869	86
Algol corinth R	870	86
Algol green B	847	85
Algol olive R	833	84
Algol orange R	824	84
Algol red B	825	84
Algol red extra		90
Algol red FF	819	84
Algol red 5G	816	84
Algol red R	819	84
Algol violet B	823	84
Algol yellow 3G	811	84
Algol yellow R	817	84
Alizarin RW		91
Alizarin SX	784	83
Alizarin astrol	856	85
Alizarin astrol B	856	85
Alizarin black B	774	83
Alizarin black S	774	83
Alizarin synthetic	778	83
Alizarin black WX	774	83
Alizarin blue S	804	83
Alizarin blue TR, 6B		91
Alizarin blue SB	804	83
Alizarin blue SR	804	83
Alizarin blue WS; WSA	858	85
Alizarin blue black B	862	85
Alizarin blue black BT	862	85
Alizarin blue black 3B	862	85
Alizarin chrome green A	260	75
Alizarin claret R	797	83
Alizarin cyanine GG	799	83
Alizarin cyanine green E, GE	865	86
Alizarin cyanine green G, 3G	865	86
Alizarin cyanole SR, SB		88
Alizarin delphinol BS		88
Alizarin direct blue B	851	85
Alizarin direct blue		91
Alizarin direct green G	865	86
Alizarin direct violet R	852	85
Alizarin direct violet ER		88
Alizarin emeraldole G		88
Alizarin fast gray 2BL		91
Alizarin fast blue BHG		91
Alizarin geranole B		91
Alizarin green soluble		91

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Alizarin green CE, V	808	84
Alizarin green S	808	84
Alizarin indigo B	894	88
Alizarin indigo G	893	88
Alizarin indigo 3R	895	88
Alizarin indigo blue G		88
Alizarin indigo green B	894	88
Alizarin irisol B	853	85
Alizarin light blue SE	858	85
Alizarin light blue B	858	85
Alizarin maroon	798	83
Alizarin orange	779	83
Alizarin orange A, R	779	83
Alizarin red 1WS	780	83
Alizarin red S	780	83
Alizarin red SDG	785	83
Alizarin red SWB	780	83
Alizarin red W	780	83
Alizarin rubinol 3G, 5G		88
Alizarin rubinol GW		88
Alizarin rubinol R, B		88
Alizarin saphirol B	858	85
Alizarin saphirol SE	858	85
Alizarin saphirol WS, WSA	858	85
Alizarin sky blue	855	85
Alizarin sky blue R	855	85
Alizarin uranole 2B		88
Alizarin viridine FF	854	85
Alkali blue 3R	536	78
Alkali fast green 3G		98
Alphanol brown B		98
Aminogene blue RN		98
Anthosine 3B		98
Anthosine 5B		98
Anthra brown B	867	86
Anthra azurine G		83
Anthracene blue WB	800	83
Anthracene blue WG	800	83
Anthracene blue 3GG		91
Anthracene blue WR	789	83
Anthracene blue SWR	790	83
Anthracene blue SWGG	790	83
Anthracene brown RD	782	83
Anthracene chromate black LC		91
Anthracene chromate brown EB, ED, EE		91
Anthracyanine brown RL		91
Anthracyanine green 3GL		91
Anthracyanine S	627	81
Anthracyl chrome green	91	74
Anthraflavone G	759	83
Anthraflavone GC	759	83
Anthra grey B	848	85
Anthraquinone blue SR	861	85
Anthraquinone blue green BXO	863	85
Anthraquinone GXNO	864	85
Anthraquinone green GXNO	864	85
Anthraquinone violet	853	85
Auramine Y	493	81
Auramine O	493	81
Auramine OO	493	81
Auramine conc	493	81
Auramine G	494	81
Aurine SIS	555	79
Autol orange		74
Autol red BL	56	74
Autol red RLP	106	74
Azo acid black B		78
Azo acid blue B	43	78
Azo carmine GX	672	82
Azo flavine	141	83
Azo fuchsine S	147	83
Azorhodine 2G N		83
Benzo Bordeaux 6B		85
Benzo bronze E		85
Benzo chrome black blue B		83
Benzo chrome brown G		83
Benzo chrome brown 5G		83
Benzo copper blue 2B		83
Benzo dark brown		91

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ope BL		93
ope 4BL		93
ope 2RL		93
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BL		93
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L	332	76
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RL	296	75
GL		93
eaux 6BL		93
n GL		93
BL		93
w RL		93
	340	76
	446	77
B	363	76
		93
red B		93
red 3B		93
	326	76
	326	76
	503	77
let 7B		88
		99
		88
e 8G		98
e FF	545	79
e V	543	78
blue G	667	81
green A		92
5G	416	77
st violet B, BL		93
ast violet 2R,		93
reen B		93
olet B		93
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	370	76
lue GW		94
ue 2B	621	81
OF	227	75
e blue B	622	81
e blue BS	622	81
reen G		94
B		94
e 2G		94
e 3BX		94
	499	77
B powder		94
	885	86
	886	86
G	887	86
blue B		88
blue		88
ne 5G	606	89
low 6G		88
	572	89
e blue R		98
e red B		98
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e	562	79
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Capri blue GON	620	81
Carbide fast black GF	462	77
Chicago red III		94
Chloramine blue BXR	386	76
Chloramine blue 3G	471	77
Chloramine brown G		94
Chloramine brilliant red 8B		94
Chloramine fast red F	343	76
Chloramine red B	319	76
Chloramine red 3B	319	76
Chloramine red 8BS, 8B	358	76
Chloramine sky blue A	426	77
Chloramine yellow GG	617	81
Chlorantine fast black B		94
Chlorantine fast blue RL	451	77
Chlorantine fast Bordeaux 2BL		94
Chlorantine fast brown 3GL		94
Chlorantine fast brown RL		94
Chlorantine fast orange TRL		94
Chlorantine fast red 7BL		94
Chlorantine fast rubine RL		94
Chlorantine fast violet BL		94
Chlorantine fast violet 4BL		94
Chlorantine fast violet 2RL		94
Chlorantine fast yellow 4GL		94
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Chlorazol fast black N		94
Chlorazol fast red K		94
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Chrome fast pure blue BX	551	79
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Chromoxane blue R		92
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Ciba blue BB	881	86
Ciba blue 2BD	881	86
Ciba blue G	882	86
Ciba Bordeaux B	919	87
Ciba gray G	899	86
Ciba green G	891	86
Ciba orange G	911	87
Ciba pink B		90
Ciba red G	906	87
Ciba red R	908	87
Ciba rose BG		90
Ciba scarlet G	907	87
Ciba violet B	901	86
Ciba violet R	901	86
Ciba yellow G	890	86
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Congo orange G	315	76
Congo orange R	373	76
Coreine RR	641	81
Corioflavine GOOO	609	80
Coriphosphine OX	606	80
Cotton pink B, BN, GN		94
Cotton scarlet	227	75
Cresyl fast violet 2B		98
Cresyl blue 2BS 2RN	621	81
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Crystal violet	516	78
Cupranil brown G		94
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Cyanine B	544	78
Cyanine green G		88
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Cyanole extra	546	79
Cyanole FF	546	79
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Diamine azo orange RR		94
Diamine brilliant scarlet 8		94
Diamine brilliant rubine 8		94
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Diamine catchine 3G		94
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Diamine dark blue B		95
Damine fast black X, XN		95
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Diamine fast blue FFB		95
Diamine fast Bordeaux 6BS		95
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Diamine fast brown GB		95
Diamine fast brown R		95
Diamine fast orange EG		95
Diamine fast orange ER		95
Diamine fast red 8BL	343	76
Diamine fast rose BBF		95
Diaminefast yellow B	617	81
Diamine gray G	241	75
Diamine heliotrope G		95
Diamine orange B, F, G		95
Diamine scarlet B	319	76
Diamine scarlet 3B	319	76
Diamine sky blue FF	424	77
Diamine yellow N	404	76
Diaminogene extra	274	75
Diaminogene blue NA	273	75
Diaminogene blue NB	273	75
Diaminogene sky blue N, 3B		95
Diamond green 3G	276	75
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Diamond phosphine GG	609	80
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Dianil fast blue GL		95
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Diazanil scarlet 4BA		95
Diazo blue B		95
Diazo Bordeaux 7B		95
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Diazo fast Bordeaux BL		
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Diazo light violet BL		
Diazo phenyl black V		
Diazo rubine B		
Diazo violet R		
Diazo sky blue B		
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Diazogene orange GR		
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Direct chrome brown B		
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Direct fast violet B		
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Direct red 8B		
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Erio chrome azurol BX	551	
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arlet R	915	87
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Helindone yellow AGG, DIG, DAGC		90
Helindone yellow 1G	849	85
Helindone yellow 3RN		91
Helio bordeaux BL		99
Helio fast blue	858	85
Helio fast violet AL		99
Hydron blue G	748	82
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Hydron Bordeaux B, R		90
Hydron brown, G, OG, OB, R		90
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Hydron olive R		90
Hydron olive G, GN		90
Hydron orange R		90
Hydron pink FB, FF		90
Hydron scarlet 2B, 3B		90
Hydron violet, B, R		91
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Imperial scarlet 3B	247	75
Indamine 6R	705	82
Indanthrene black BB	768	83
Indanthrene blue BCD		91
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Indanthrene blue GC	843	84
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Indanthrene blue green B	765	82
Indanthrene brilliant violet RRP	767	83
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Indanthrene violet BN, FRN		91
Indanthrene violet R	766	82
Indanthrene violet RN	832	84
Indanthrene violet RR	767	83
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Ink blue BITN		99
Iris violet extra	686	82
Isamine blue R, 8B		98
Janus black		98
Janus blue B	126	74
Janus green G	124	74
Janus red B	240	75
Janus yellow G	222	75
Jasmine	140	74
Japan black MBG		99
Katigene kaki G extra		98
Katigene brilliant green 3G		98
Katigene green 2 G	746	82
Kiton blue A		89
Kiton fast green V	564	79
Kiton fast red R		89
Kiton fast violet 10 B	528	78
Kiton fast yellow R		89
Kiton fast yellow 3 G		89
Kiton pure blue V	543	78
Kiton red G		89
Kiton red S		89
Kiton yellow S		89
Kryogene violet 3RX	754	82
Lanacyl blue marine B	187	75
Lanasol brown 2R		92
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Light green yellowish SFXX	505	77
Lithol fast orange R		99
Lithol fast yellow 2G		99
Lithol rubine 3B		99
Malachite green	495	77
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Meldola's blue 3 R conc	649	81
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Methyl Lyons blue	537	78
Methyl silk blue NCW	537	78
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Methyl violet NFB	515	78
Methyl violet B, 2B, 6B	515	78
Methyl violet 6B extra	517	78
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Methylene blue BG	659	81
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Methylene green G	660	81
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Methylene green IA		98
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Naphthalene black APB		89
Naphthalene blue black P		89
Naphthalene green V	564	79
Naphthalene yellow	6	74
Naphthamine blue GEF	338	76
Naphthamine blue 3R	338	76
Naphthamine blue JE		96
Naphthamine fast black KSG		96
Naphthamine fast blue B		96
Naphthamine fast brown BL		96
Naphthamine fast green Y, G		96
Naphthamine fast gray B		96
Naphthamine fast violet FB		96
Naphthamine light blue B, 4B, R, FF		96
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Naphthamine light violet 2B		96
Naphthamine violet BE	336	76
Naphthamine yellow BN	9	74
Naphthazine blue JEF		96
Naphthogene blue B		96
Naphthogene blue 2R		96
Naphthogene blue 4R		96
Naphthogene indigo blue B		96
Naphthylamine black 6B	266	75
Naphthylamine brown	160	75
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Naphtochrome violet R		99
Neolan blue B, G		99
Neolan green B		99
Neolan gray B		99
Neolan red B		99
Neolan violet R		99
Neolan yellow G, R		99
Neptune blue BGX	543	78
Neptune green SGX	503	77
New claret RX		99
New ethyl blue BS	130	74
New magenta C	512	78
New methylene blue N	663	81
Night blue	590	79
Night blue	521	78
New Victoria blue B	558	79
Neutral blue R	676	82
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Nigrosine alcohol soluble	698	82
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Nitrosamine red	56	74
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Omega chrome brown PG		92
Omega chrome brown PB		92
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Oxamine brilliant violet RX		96
Oxamine fast pink BX		96
Oxamine light blue G		96
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Oaxmine red 3BX	346	76
Oxy diaminogene ED		96
Palatine black	220	75
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Palatine chrome brown RX	154	75
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Para brown V extra		96
Parmé soluble in spirit		96
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Patent marine blue LE	503	77
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Soluble pure blue		89
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Sulphoncyanine OR		89
Sulphoncyanine black	265	75
Sulpho rhodamine BG	579	80
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Supramine balck BR		89
Supramine brown R		89
Supramine red 2G		89
Supramine yellow R		89
Tetra cyanole	543	78
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Thiazine brown		97
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Thioflavine T	618	81
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Thiogene brown GR		98
Thiogene new blue 2RL		98
Thio indigo pink An, BN	910	87
Thio indigo red 3B	918	87
Thio indigo rose RN		91
Thio indigo rose, BN		91
Thio indigo scarlet 2B		91
Thio indigo scarlet 2G	906	87
Thional brilliant blue 6B		98
Thional brilliant green 2G	746	82
Thionine blue GO	661	81
Thionine blue gold		98
Thionine green GG		98
Thionol brown GD		98
Thionol brown R, Q		98
Thionol orange		98
Thionol green DY		98
Thinol yellow GR		98
Thinol yellow 3RD		98
Thionone black 6R		98
Thionone Isabellina		98
Toluidine blue	659	81
Toluylene fast orange GL	392	76
Toluylene red	358	76
Triazol orange G		97
Trisulphon bronze B		97
Trisulphon brown B	449	77
Trisulphon brown MB	449	77
Trisulphon brown GG	457	77
Trisulphon violet B	322	76
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Typhan blue	391	76
Typan red	359	76
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Ultra orange R	58	74
Ultra violet MO	635	81
Ursol	923	87
Ursol A	923	87
Ursol DF	923	87
Ursol 4R	923	87
Ursol gray G, B, ALA	923	87
Ursol gray R	923	87
Vat pink R		91
Vat pink B		91
Vat yellow R	849	85
Vat brown CM		91
Vat heliotrope R		91
Vat red 2B		91
Vat yellow CG		91
Victoria black B	262	75
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Violet B		89	Wool green S	566	
Violet PDH		98	Xylene blue VS	507	
Violet R	514	78	Xylene cyanol FF	546	
Washmarine		99	Xylene fast green B	564	
Water blue	539	78	Xylene fast light yellow 2G	22	
Wool black GRF	220	75	Xylene fast light yellow R	22	
Wool black N		89	Xylene red B	579	
Wool blue 5B	565	79	Zambesi black D, F, V		
Wool blue 8R	562	79	Zambesi pure blue 4B	274	
Wool blue 3R	565	79			

PART IV.

CENSUS OF SYNTHETIC ORGANIC CHEMICALS, NOT OF COAL-TAR ORIGIN, 1922.

Part IV.

CENSUS OF SYNTHETIC ORGANIC CHEMICALS OTHER THAN THOSE OF COAL-TAR ORIGIN, 1922.

Introduction.

The United States Tariff Commission published for the first time in 1921 a census of the production of synthetic organic chemicals other than those of coal-tar origin. The commission has again in 1922 compiled such a census showing the quantity of production, the amount, and value of the sales in all cases where the figures could be published without disclosing the operations of the individual producer.

The products included in this census comprise synthetic organic compounds derived from sources other than coal tar. They do not include aliphatic compounds derived from natural sources by isolation, distillation, extraction, hydrolysis, or purification, as for example alkaloids, constituents of essential oils, sugars, and acids, such as stearic and tartaric. Nor does the census include cyanides, cyanamides, or carbides of metals or inorganic radicals. Statistics of items which are obtainable from other sources are in most cases excluded.

The Bureau of the Census gives in its reports statistics of the more important noncoal-tar organic compounds. The Tariff Commission has not attempted to collect statistics on these commodities for 1922, except in a few instances where the importance of the industry or other conditions warranted. A summary table of the 1914, 1919, and 1921 production of organic chemicals as determined by the Bureau of the Census is incorporated in this report.

The production of synthetic organic chemicals other than those derived from coal tar, in 1922, was 79,202,155 pounds compared with 21,545,186 pounds in 1921. The sales in 1922 amounted to 60,494,494 pounds, valued at $11,964,074. In this production are included 1,097 pounds of research chemicals, and in the sales are included 376 pounds, valued at $5,855, or $15.51 per pound.

Developments in the Industry.

The establishment of the synthetic organic chemical industry was a direct result of the war. Previous to the World War, chemicals of this class were imported almost entirely from Germany. The United States produced a few of those used in large quantities. After the outbreak of the war the acute shortage of synthetic organic chemicals for the perfume, flavor, pharmaceutical, and fine chemical trade in general created for a time a serious situation. The American manufacturers of these products deserve high credit for the rapid growth of the industry, the variety of products, and the continuous improvement in the quality of the products.

SYNTHETIC AROMATIC CHEMICALS.

The synthetic aromatic chemical industry, which is a source of supply of raw materials for the flavoring and perfumery industries, appears to be in a healthy condition since the resumption of general business activity. The constant aim of manufacturers is to make the best quality of products possible. The manufacturing perfumer knows that it is false economy to use any product, either natural or artificial, which has a by-odor or which may discolor or decompose his finished perfumes. Citronellol, terpineol, ionone, geranyl acetate, and many of the esters used in perfumes and flavors show large increases in production. Heliotropin and vanillin show a slight increase. Geraniol and linalyl acetate are some of the more important synthetics which show a decrease in production.

Esters.—The manufacture of esters appears to have made great strides in the past year. The total production of amyl acetate for the year 1922 was 1,692,074 pounds; that of ethyl acetate was 16,114,458 pounds as compared with 5,310,688 pounds in 1921. Several new fruit esters are reported for the first time in 1922, including some of the oenanthates and vanillyl vanillate.

Choloroform and carbon tetrachloride.—The production of chloroform and of carbon tetrachloride increased very greatly in 1922. The latter is a raw material used to a large extent as a solvent and is highly valued as a fire extinguisher. Its output in 1922 was 11,166,318 pounds.

Pharmaceuticals.—The manufacturers of synthetic medicinals have increased production in barbital, chloral hydrate, and hexamethylenetetramine. The last named is used not only in medicine but in greater amounts as a rubber vulcanizer and in the manufacture of synthetic resins. Formaldehyde, which is used as a disinfectant and antiseptic and in the manufacture of hexamethylenetetramine, shows a total production in 1922 of 23,958,152 pounds.

Some medicinals of particular interest which were first reported in 1922 are the esters of chaulmoogra oil, used in the treatment of leprosy; theocin sodium acetate used as a stimulant diuretic; and 8-chlorotheophyllin.

Butyl alcohol.—The production of butyl alcohol in 1922 represents a very large increase over the 1921 production when it exceeded 2,000,000 pounds. Butyl alcohol is used largely as a solvent in pyroxylin plastics.

Aldehyde ammonia, which is used as an accelerator in the vulcanization of rubber, shows an increase in production for the year 1922. Other acetylene derivatives were also manufactured in this country in larger quantities than heretofore; acetaldehyde and aldol both show an increased production. The United States has produced only a part of its requirements of acetaldehyde and its polymerized form, paraldehyde. These products are imported in large amounts from Canada, where during the war a large plant was erected at Shawinigan Falls to produce acetic acid and acetone from acetylene.

Ethylene and propylene derivatives.—Ethylene dichloride and ethylene chlorohydrin, both of which find important uses as solvents and in further organic synthesis, were made in commercial quantities in 1922.

These derivatives are manufactured by at least two companies. The process is based upon the recovery of ethylene and propylene from the waste gases of petroleum cracking processes and other hydrocarbon gases. Other products from these sources are diethyl sulphate, used as an ethylating agent, particularly in dye manufacturing, and isopropyl alcohol, used in organic synthesis, particularly for the perfumery and flavoring industries.

Mucic acid, which is now made on a commercial scale, is produced by the hydrolysis and oxidation of mixtures of glucose and galactose obtained from the western larch (larix occidentalis). It is used as an ingredient in baking powder and as a mordant and chrome assistant in textile dyeing. It may have value as an acidulent to be used in lieu of citric or tartaric acid.

Gallic acid and *pyrogallic acid* are important products in this group. Gallic acid is a white crystalline substance made from nutgalls and is of use in the manufacture of dyes, pyrogallic acid, ink, and in medicine. Pyrogallic acid is one of the oldest of photographic developers.

Dihydroxytartaric acid.—A large increase in the manufacture of this product is noted for 1922. It finds use in the manufacture of a dye known as tartrazine.

Furfural, a comparatively new product, was first made in commercial quantities in 1922. This synthetic may be the basis of a new industry of great size, as corncobs, the necessary raw material, are now waste material available in unlimited quantities. Furfural may have valuable uses in the synthetic resin and varnish industry.

Lactic acid, used in the leather, textile, and dye industries, will probably continue to appear on the market in larger amounts. Its manufacture by a controlled fermentation process is an American development.

Oxalic acid is one of the most important chemicals of this group of synthetics. Production as reported for 1922 by 4 concerns totaled 3,978,807 pounds.

TABLE 16.—*Production and sales of synthetic organic chemicals, 1922.*

(Not derived from coal tar.)

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 117. An X signifies that the corresponding chemicals were made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there were sales of the corresponding chemicals in the United States during 1922, but that the figures can not be published without revealing information in regard to the sales of individual firms. The blank space in the sixth column indicates that there was actual production of the corresponding chemicals in the United States during 1922, but that the figures can not be published without revealing information in regard to the output of individual firms. The details thus withheld are, however, included in the totals.]

Name.	Manufacturer's identification number (according to list on p. 117).	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
Total		*Pounds.* 60,494,494	$11,964,074	$0.20	*Pounds.* 79,202,155
Acetaldehyde	27, 72, 107, 145				71,537
Acetaldol (aldol)	27				
Acetamide	53, 68, 170				
Acetic acid ester of tannic acid	17				
Acetic anhydride	63				
Acetine	125				
Acetylene tetrabromide	63				

TABLE 16.—*Production and sales of synthetic organic chemicals, 1922*—Continued.

Name.	Manufacturer's identification number (according to list on p. 117).	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Aldehyde ammonia	27, 145				
Allyl alcohol	140				
Allyl chloride	140				
Allylisothiocyanate	31, 140				
Ammonium valerate	174				
Amyl acetate	10, 64, 72, 76, 123, 125, 137, 158, 170, 189, 191.	1,158,455	$374,028	$0.32	1,692,674
Amyl alcohol and higher alcohols.	189, X				
Amyl butyrate	22				
Amyl oenanthate	72				
Amylene	177				
Anethol	72, 76, X				
Anisaldehyde (anbepine)	22, 72, 75, 76	2,141	8,266	3.86	2,382
Borneol	69, 129				
Bromodiethylacetylcarbamide.	17				
Bromocamphor	63, 114				
Bromoform	63				
Butyl acetate, n. and sec	64, 68, 72, 76, 123, 191, X, X	438,205	117,156	.27	2,467,506
n-Butyl alcohol (butanol)	42, 189				
sec.-Butyl alcohol	X				
Butyl aldehyde	42				
n-Butyl bromide	68, 177				
n-Butyl iodide	68, 177				
Butyl oenanthate	72				
Butyl tartrate	42				
Butyl xanthic disulfide	128				
Butyric acid	42				
n-Butyric acid	76, 137				
n-Butyric acid, crude	X				
Butyraldehyde	27, 72				
d-Camphoric acid	114				
n-Caproic acid	72, 76, 137, 170, 177				537
Caprylic acid	177				
Carbon tetrachloride	63, 135, 197	9,231,824	760,439	.08	11,196,318
Chaulmoogric ester	17				
Chloral hydrate	120, 124				
Chloroacetic acid (Mono)	63, 64				
Chloroform	37, 63				
8-Chloro-theophyllin	17				
Citronellol	72, 76, 101, 184, 190, 192	3,351	23,298	6.95	3,953
Citronellyl acetate	72, 76, 176, X	55	301	5.47	195
Creosote	138				
Crotonaldehyde	27				
Cyanacetic acid	17				
Decyl alcohol	72				
Decyl aldehyde	72, 76				
Diacetylmorphine (Heroin)	133, 149				
Dibromobehenate of calcium	17				
n-Dibutylamine	1, 68				
Dichloroacetone	17				
Dichlorhydrin	17				
Dichloropentanol	17				
Diethyl acetic acid	17				
Diethylamine	1, 89, 170				979
Diethylamine-ethanol	89				
Diethylbarbituric acid (barbital or veronal).	1, 17				
Diethylbarbituric acid sodium (Sodium barbital).	17				
Diethyl sulfate	27				
Dihydroxytartaric acid	25, 147				
Diiodohydroxypropane	17				
Dimethylglyoxime	68, 170, 177				81
1:3 Dimethylxanthine	17				
Disuccinyl peroxide (alphozone).	173				
Duodecyl alcohol	72				
Duodecyl aldehyde	72				
Duodecyl ketone	72				
Erucic acid	17				
Ethoxyacetic acid	17				
Ethyl acetate (85%)[1]	10, 64, 72, 114, 123, 125, 158, 189, 192, X, X, X.	11,801,661	1,013,515	.09	16,114,458

[1] Correct value for 1921 sales $249,600 and unit value $0.85.

-*Production and sales of synthetic organic chemicals, 1922*—Continued.

	Manufacturer's identification number (according to list on p. 117).	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
.....	76, 170, 189				
.....	17, 63, 89, 114, 178, 192				155,162
.....	22, 72, 76, 137, 170, 189, 192, X, X, X	32,192	$37,883	$1.18	22,958
.....	68, 72, 189				
.....	189				
.....	48, 75, 80, 157, 189, X, X	156,411	59,149	.38	164,198
.....	192				
.....	48, 64, 72, 114, 172, 189, X	3,712,997	429,940	.12	4,017,043
.....	137, 189, 192, X	1,383	1,127	.81	1,627
l ester of	17				
.....	68, 114, 120, 177	268	1,621	6.05	238
.....	72, 76, 137, 189	271	1,074	3.96	
.....	72, 189				
.....	72, 177				
.....	189				
.....	189				
fono and	1, 17, 72, 170, 177				21,747
etate.....	189				
.....	114, X				
.....	72, 76, 101, 137, 192	3,370	5,584	1.66	4,731
.....	17, 72, 189, 192				23,025
.....	22, 72, 76, 125	626	1,356	2.17	971
.....	72, 170, 189, 192, X				
.....	72, 76, 190, X				175
.....	189				
.....	63				
drin.....	27, 89				
e.....	27				
.....	27				
.....	27				
e.....	68				
ber.....	72				
' cent)....	57, 123, 138, 145, 154, X	16,140,007	1,676,401	.10	23,958,152
.....	X				
.....	127				
.....	152, 170				
.....	68, 114, 205	96,100	48,308	.50	411,768
.....	205				
.....	76, 184				
.....	72, 76, 125, 176, 190, X	5,828	12,674	2.17	7,066
.....	72, 76, 101				65
.....	72, 76, 101, 176, 190	32	190	5.94	80
.....	72				
rohydrin..	68				
acid and	138, X				
.....	27				
.....	22, 72, 75, X	5,919	12,497	2.11	6,794
.....	72, 128, 170, 190				
.....	68, 72				
.....	27, 63				
ramine....	138, 145, 154, X	1,691,802	1,168,984	.69	2,015,161
ram i n e-	17				
ne citrate.					
.....	42				
.....	184				
.....	72				
n, basic..	17				
.....	17				
.....	114, 133, 149	11,981	57,375	4.79	11,811
.....	72				
.....	76, 101, 125, 190, 192, X				18,626
.....	174				
.....	72, 137, 189, X, X	5,039	7,080	1.41	5,576
.....	72, 137, 189				155
.....	72, 137, 189				
.....	68, 170, 177			4.33	47
.....	189				
.....	72, 76, 137, 189	140	400	2.86	510
.....	189				
.....	72, 76, 137, 189	36	128	3.56	70
.....	72, 189				

' 1921 sales $929,125 and unit value $0.31.

TABLE 16.—*Production and sales of synthetic organic chemicals, 1922*—Continued.

Name.	Manufacturer's identification number (according to list on p. 117).	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
Isobutyl indol	72				
Isobutyl isovalerate	189				
Isobutyl oenanthate	72				
Isobutyl propionate	72, 189				
Isobutyric acid	76, 137				
Isobutyraldehyde	72				
Isoeugenol	22, 72, 193, X	2,638	$11,510	$4.36	
Isopropyl acetate	72				
Isopropyl alcohol (Isopropanol).	27, 140, 189, X	247,392	130,418	.54	256,[illegible]
Isopropy chloride	27, 140				
Isopropyl formate	189				
Isopropyl oenanthate	72				
Isovaleric acid	137, 174				
Lactic acid	194, X				
Lauric acid	177				
Limonene alcohol	192				
Linalyl acetate	72, 76, 101, 176, 190	589	4,805	8.16	736
Linalyl butyrate	72				
Linalyl formate	72, 176, 190	27	249	9.22	
Linalyl propionate	72				
Linalyl valerate	72				
dl-Malic acid	127				
Methyl acetate	123, 189				
Methylamine	68				
Methyl bromide	63, 177				
Methylene citrate acid	17				
Methyl-n-butyrate	72, 137, 189	22	40	1.82	3[illegible]
Methyl eugenol	72, 176				
Methyl formate	189				
Methyl indol (Skatol)	72				
Methyl iodide	177				
Methyl isoeugenol	176				
Methyl oxalate	72, 189				
Methyl propionate	72, 189				
Methyl sulfate	X				
Monoacetine	189				
Monochlorodimethyl ether	17				
Monodibehenate of calcium	17				
Mucic acid	99				
Nonyl alcohol	72, 76				
Nonyl aldehyde	72, 76				[illegible]
Octodecyl alcohol	72				
Octodecyl aldehyde	72				
Octodecyl ketone	72				
Octyl acetate and sec. octyl acetate.	72, 76, 176, 190	8	325	40.63	5[illegible]
Octyl alcohol, n. and sec.	68, 72, 76, 176, 177, 190	23	440	19.13	19[illegible]
Octyl aldehyde	72, 101				
Octyl formate	176				
Oxalic acid	5, 99, 139, X	4,099,228	562,439	.14	3,978,[illegible]
Paracetaldehyde	27, 107				
Paraformaldehyde	138, 145				
Pentachloroethane	27				
Perchlorethylene	27				
Piperinic ketone (piperonone)	72				
Propionic acid, crude	X				
Propionic acid	X				
Propionic aldehyde	72				
n-Propyl acetate	72, 76, 189				14[illegible]
n-Propyl alcohol	140, 170, 189				
n-Propyl isovalerate	189				
n-Propyl-n-butyrate	189				
Propyl oenanthate	72				
n-Propyl propionate	72, 189				
Propylene chlorohydrin	27				
Propylene dichloride	27				
Propylene glycol	27				
Pyrogallic acid (Pyrogallol)	68, 114, 205	174,940	181,674	1.38	197,5[illegible]
Pyruvic acid	25				
Quatrodecyl alcohol	72				
Quatrodecyl aldehyde	72				
Quatrodecyl ketone	72				
Research chemicals	68, 177				
Rhodinol	72, 76, 101, 190, X	767	10,955	14.28	77[illegible]
Rhodinol acetate	72, 176				
Rhodinol butyrate	72				

ABLE 16.—*Production and sales of synthetic organic chemicals, 1922*—Continued.

Name.	Manufacturer's identification number (according to list on p. 117).	Sales.			Total production.
		Quantity.	Value.	Average price per pound.	
		Pounds.			*Pounds.*
nol formate	72, 176				
nol valerate	72				
lecyl aldehyde	72				
lecyl alcohol	72				
lecyl ketone	72				
ic acid	114, 173				
ic anhydride	173				
methane, U. S. P	147				
yl butyrate	72				
yl formate	72				
yl propionate	72				
eol	69, X				
hydrate	193				
eolene	69, 129				
yl acetate	72, 76, 101, 125, 176, X	13, 290	$19, 306	$1.45	13, 802
chloroethane	27				
ethyldiaminopenta-	17				
n sodium acetate	17				
in	76, 189				
roethylene	27				
rotertiary butyl alcomethaform).	173, X				
yl alcohol	72				
yl aldehyde	72				
yl ketone	72				
hylene bromide	1				
refined	64				
ric acid	76, 177				
c acid	72				
c alcohol	72				
n	75, 76, 118, 124, 193, X	239, 778	1, 716, 766	7.16	221, 046
yl vanillate	72				
utyl xanthate	128				
alerate	174				
iers	177				

E 17.—*Comparison of production of synthetic organic chemicals, 1921 and 1922.*

Name.	1922	1921	Name.	1922	1921
	Pounds.	*Pounds.*		*Pounds.*	*Pounds.*
dehyde	71, 537	36, 671	Geranyl butyrate	65	40
dehyde (Aubepine)	2, 302	2, 358	Geranyl formate	80	62
hyl glyoxime	91	221	Hexamethylenetetramine	2, 015, 161	981, 927
acetate	16, 114, 458	5, 310, 688	Iodoform	11, 811	4, 606
bromide	155, 162	176, 744	Isoamyl butyrate	5, 576	7, 334
butyrate	22, 958	42, 144	Isoamyl formate	155	1, 642
chloride	164, 198	106, 813	Isoamyl nitrite	47	277
ether	4, 017, 043	3, 025, 041	Iso butyl acetate	510	587
formate	1, 627	2, 413	Iso butyl butyrate	70	67
iodide	238	216	Iso propyl alcohol	256, 868	184, 470
malonate (mono and			Linalyl acetate	736	1, 746
	21, 747	56, 306	Methyl n-Butyrate	36	29
oenanthate	4 731	4, 442	Pyrogallic acid	187, 536	197, 337
pelargonate	971	576	Terpinyl acetate	13, 802	7, 836
acid, technical	411, 768	306, 431	Vanillin	221, 046	206, 150

TABLE 18.—*Domestic production of organic chemicals (except coal tar), 1914, 1919, and 1921.*

[From Bureau of the Census; 1921 figures are preliminary.]

Name.	1914	1919	1921
	Pounds.	*Pounds.*	*Pounds.*
Acetic acid (pyroligneous)	75,303,375	42,248,803	[1] 23,530,100
Acetic acid (glacial)		20,131,487	11,115,200
Acetic anhydride		1,794,985	
Tartaric acid	[2]	5,312,965	[2]
Formaldehyde	[1] 8,426,247	25,006,815	9,892,700
Amyl acetate	1,315,730	917,793	410,000
Ethyl acetate	[2]	5,780,549	906,600
Ethyl chloride	[2]	248,103	208,300
Ethyl ether	[1] 2,120,082	4,875,255	2,763,300
Acetone	[1] 10,425,817	6,045,914	4,380,100
Methyl ethyl ketone	[2]	1,158,032	
Carbon tetrachloride	[2]	11,908,704	
Chloroform	1,333,954	1,677,641	944,300
Vanillin	120,619	134,687	191,700
Codeine and salts	[2]	3,295	[2]
Heroin and salts	[2]	6,933	[2]
Cocaine and salts	[2]	6,781	[2]

[1] Dilute. [2] Figures not available. [3] Production for sale.

TABLE 19.—*Synthetic organic chemicals imported in excess of $100 in value during the year ended June 30, 1914.*[1]

Article.	Quantity.	Value.	Article.	Quantity.	Value.
	Pounds.			*Pounds.*	
Acetin (commercial)	15,958	$2,425	Gallic acid	61,644	$20,417
Acetylenetetrachloride (tetrachloroethane)	93,581	5,636	Geranyl acetate	198	634
Ammonium valerate	1,801	1,637	Heliotropin, crystals	10,219	8,713
Amyl butyrate	350	181	Hexamethylenetetramine	11,470	21,138
Amyl nitrite		122	Iodoform	93	222
Amylene	26	100	Ionone:		
Aubepine:			Alcoholic solution	50	71
Technical	1,302	864	For soap	104	565
Liquid	2,101	2,901	Alpha, pure	35	542
Barbituric acid	39,924	2,837	Iron valerate	1,109	1,013
Butyric acid, 60 per cent	51,530	13,467	Methyl aniline, pure	13	137
Pure	13	41	Methyl iodide	26	98
Calcium glycerophosphate:			Monochloracetic acid:		
Granulated, 6 per cent	4,697	814	Commercial	12,834	2,739
Liquid, 50 per cent	15,757	9,935	Pure crystals	318	171
Soluble	1,347	1,611	Octyl aldehyde	4	127
Granulated, effervescent	305	849	Pyrogallic acid	24,964	22,404
Camphoric acid	75	138	Quinine valerate	283	1,436
Carbon tetrachloride	572,987	28,322	Rhodinol	181	1,493
Chloral hydrate	800	208	Succinic acid:		
Chloroform	2,745	2,086	Crude sublimed	35	92
Citronellol	1,526	4,318	Pure crystals	620	2,224
Cocaine [2]	3,340	4,163	Anhydrous	34	455
Codeine, alkaloid	32	1,669	Terpin hydrate	12,797	2,052
Phosphate [2]	335	773	Terpinyl acetate	19,473	10,613
Sulphate [2]	1,275	2,648	Thiosinamine	111	256
Dichlorohydrin	782	500	Thymol	19,056	24,765
Dimethylglyoxime	28	301	Trichloracetic acid:		
Ethyl butyrate (absolute)	1,363	515	Technical	4	2
Ethyl carbonate	6	311	U. S. P	439	346
Ethyl chloride	9,137	10,210	Urea	18,137	8,869
Ethyl ether	992	160	Valeric (Valerianic) acid	1,164	735
Over sodium	3,512	870	Vanillin [2]	38,472	7,554
Reagent	122	119	Veronal (diethyl barbituric acid	4,971	26,322
Eugenol:			Veronal sodium (sodium diethylbarbiturate	593	5,284
Crude	5	4	Zinc valerate, powder	1,517	1,373
Other	485	987			

[1] Miscellaneous Series No. 82, Department of Commerce. [2] Ounces.

TABLE 20.—*Imports and production of synthetic organic chemicals (except those of coal-tar origin), 1922.**

Article.	Imports.				Production (pounds).
	First 9 months.		Last 3 months.		
	Pounds.	Value.	Pounds.	Value.	
Acetic or pyroligneous acid	18,706	$1,318			
Containing by weight—					
Not more than 65 per cent acetic acid			43	$19	
Formic acid	22,744	2,368	255,397	18,113	
Gallic acid	4,490	2,387			411,768
Glycerophosphoric acid, and salts and compounds	5,460	4,789	7,021	3,870	
Lactic acid	380,840	37,913			
Containing by weight of lactic acid—					
55 per cent or more			5,000	758	
Oxalic acid	29,767	3,591	1,260,308	102,895	3,978,807
Pyrogallic acid			1	3	187,536
Methyl alcohol	[1] 25	39	[1] 2	4	
Carbon tetrachloride	44,092	1,251	22,039	603	11,166,318
Chloroform			15	3	
Chloral hydrate	1,000	895	354	291	
Cocaine, etc	[2] 5,015	11,514	[2] 2,503	7,031	
Ethers and esters:					
Containing not more than 10 per cent alcohol—					
Ethyl ether					[2] 4,017,043
Ethyl chloride	9,774	1,811	7,322	9,095	[2] 164,198
Amyl acetate	200	258			[2] 1,692,074
Amyl nitrate	6	17			
Ethyl acetate	200	276	68	14	[2] 16,114,458
Nitrous spirits of	1,998	1,365			
Other n. s. p. f	2,287	1,034			
Containing more than 50 per cent alcohol	1,616	1,442			
Formaldehyde solution (not more than 40 per cent)	407	67			23,958,152
Formaldehyde solution (formalin)			300	50	
Hexamethylenetetramine			16,010	7,765	2,015,161
Iodoform					11,811
Urea	182,257	43,891	78,379	17,670	
Thymol	6,666	21,220	4,737	13,206	
Vanillin	[2] 3,514	1,448			221,046

* Preliminary figures for imports.
[1] Gallons.
[2] Ounces.
[3] Alcohol content unknown.

Directory of manufacturers of dyes and other synthetic organic chemicals, 1922.

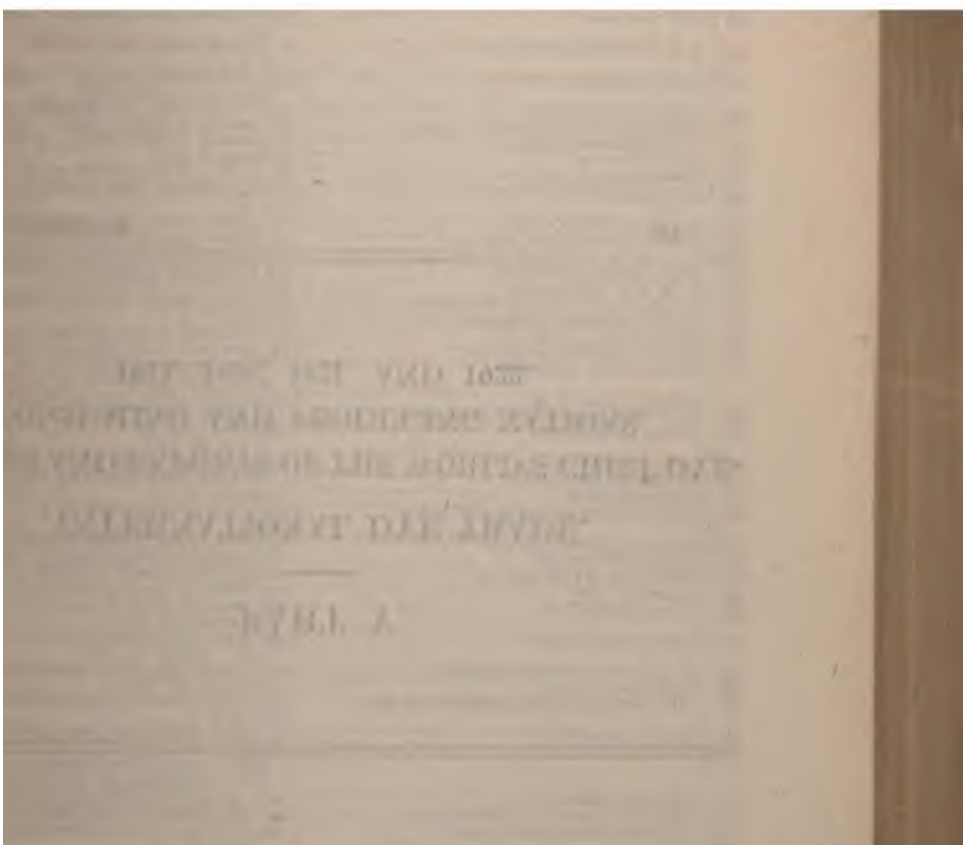
No.	Name of company.	Office address (location of plant given in parenthesis if not in same city as office).
1	Abbott Laboratories	4753 Ravenswood Avenue, Chicago, Ill.
2	Agawam Chamical Works	531 Grosvenor Building, Providence, R. I. (North Attleboro, Mass.)
3	Althouse Chemical Co	500-540 Pear Street, Reading, Pa.
4	Amalgamated Dyestuff & Chemical Works (Inc.)	Plum Point Lane, Newark, N. J.
5	American Alkali & Acid Co	43 Main Street, Bradford, Pa.
6	American Aniline Products (Inc.)	80 Fifth Avenue, New York City. (Lock Haven Pa.)
7	American Chemical Works, The	331-341 Bay Street, San Francisco, Calif.
8	American Tar Products Co. (Inc.)	208 South La Salle Street, Chicago, Ill. (Chicago, Ill.; Youngstown, Ohio.; St Louis, Mo.; Woodward, Ala.; Follansbee, W. Va.; Carrollville Wis.)
9	American Vat Color Manufacturing Co	80 Fifth Avenue New York City. (Lock Haven, Pa.)
10	Anderson Chemical Co	P. O. Box 307, Passaic, N. J. (262 Lodi Avenue, Wallington, N. J.)
11	Ansbacher & Co. (Inc.), A. S	527 Fifth Avenue, New York City. (Brooklyn, N. Y.)
12	Atlantic Dyestuff Co	88 Ames Building, Boston, Mass. (Portsmouth, N. H.)
13	Atlantic Tar & Chemical Works (Ltd.)	Bayway, Elizabeth, N. J. (Elizabeth, N. J.)
14	Atlas Color Works	322 Ninth Street, Brooklyn, N. Y. (417 Hamilton, Avenue, Brooklyn, N. Y.)
15	Baird & McGuire (Inc.)	Holbrook, Mass.
16	Barrett Co. The	40 Rector Street, New York City. (Plants distributed throughout United States.)
17	Bayer Co. (Inc.) The	117 Hudson Street, New York City. (Rensselaer, N. Y.)
18	Beaver Chemical Co. (Inc.)	Damascus, Va.

Directory of manufacturers of dyes and other synthetic organic chemicals, 1922—Continued.

No.	Name of company.	Office address (location of plant given in parenthesis if not in same city as office).
19	Beaver Manufacturing Co	Ballardvale, Mass.
20	The Briggs Chemical Co	Amherst, Ohio.
21	Brooklyn Color Works (Inc.)	Stewart Avenue and Cherry Street, Brooklyn, N. Y.
22	Bush Co. (Inc.), W. J	370 Seventh Street, New York City. (Linden, N. J.)
23	Butterworth-Judson Corporation	30 Church Street, New York City. (Newark, N. J.)
24	Cabot (Inc.), Samuel	141 Milk Street, Boston, Mass.
25	Calco Chemical Co., The	Bound Brook, N. J.
26	California Ink Co. (Inc.)	West Berkeley, Calif.
27	Carbide & Carbon Chemicals Corporation	30 East Forth-second Street, New York City (Clendenin, W. Va.)
28	Carey Manufacturing Co., The Philip	Lockland, Ohio.
29	Carus Chemical Co	1377 Eighth Street, La Salle, Ill.
30	Central Dyestuff & Chemical Co	Plum Point Lane, Newark, N. J.
31	Central Specialty Co	524 Delaware Street, Kansas City, Mo.
32	Certain-teed Products Corporation	Boatsmen's Bank Building, St. Louis, Mo. (East St. Louis, Ill.)
33	Chatfield Manufacturing Co., The	Seventy-fourth and Lebanon Streets, Station F, Cincinnati, Ohio.
34	Chemical Company of America (Inc.), The	46 Murray Street, New York City. (Springfield, N. J.)
35	Childs & Co. (Inc.), Charles M	43 Summit Street, Brooklyn, N. Y.
36	Chiris Co., Antoine	147-153 Waverly Place, New York City. (Delawanna, N. J.)
37	Chlorine Products Co	81 Maiden Lane, New York City. (Niagara Falls, N. Y.)
38	Cincinnati Chemical Works (Inc.)	Evanston Station, Box 20, Cincinnati, Ohio. (Norwood and St. Bernard, Ohio.)
39	Citizens Gas Co	Majestic Building, Indianapolis, Ind.
40	Coleman & Bell Co	Norwood, Ohio.
41	Combustion Utilities Corporation	24 State Street, New York City.
42	Commercial Solvents Corporation	Terre Haute, Ind.
43	Commonwealth Chemical Corporation	25 West Forty-third Street, New York City. (Newark, N. J.)
44	Commonwealth Color & Chemical Co	Nevins, Butler and Baltic Streets, Brooklyn, N. Y.
45	Condensite Company of America (Division of Bakelite Corporation).	Bloomfield, N. J. (Wyandotte, Mich.)
46	Consolidated Color & Chemical Co	122 Hudson Street, New York City. (Newark, N. J.)
47	Cooks Falls Dye Works	5 Cedar Street, New York City. (Cooks Falls, N. Y.)
48	Coopers Co., Charles	194 Worth Street, New York City. (Newark, N.J.)
49	Coopers Creek Chemical Co	West Conshohocken, Pa.
50	Corona Chemical Division (Pittsburgh Plate Glass Co.)	213-215 Lake Street, Milwaukee, Wis.
51	Crescent Color & Chemical Works (Inc.)	Fifty-ninth Street and Eleventh Avenue, New York City. (Dunellen, N. J.)
52	Croton Color & Chemical Co. (Inc.)	293 Broadway, New York City. (Croton-on-Hudson, N. Y.)
53	Crystal Chemical Co	3854 North Harding Avenue, Chicago, Ill.
54	Davis Chemical Products (Inc.)	671 Broad Street, Newark, N. J. (Springfield, N. J.)
55	Debrook Co. (Inc.)	26 Court Street, Brooklyn, N. Y. (1105 Metropolitan Avenue, Brooklyn, N. Y.)
56	Dehls & Stein	237-243 South Street, Newark, N. J.
57	Delta Chemical & Iron Co	Wells, Delta Co., Mich.
58	Dermatological Research Institute (Inc.)	1720-1724 Lombard Street, Philadelphia.
59	Devoe & Raynolds Co. (Inc.)	101 Fulton Street, New York City. (New York and Chicago.)
60	Diarsenol Co. (Inc.)	904 Ellicott Square, Buffalo, N. Y.
61	Dicks David Co. (Inc.)	44 Watts Street, New York City. (Chicago Heights, Ill.)
62	Dissosway Chemical Co. (Inc.)	55 Eckford Street, Brooklyn, N. Y.
63	Dow Chemical Co., The	Midland, Mich.
64	Du Pont de Nemours & Co. (Inc.), E. I	Tenth and Market Streets, Wilmington, Del. (Deepwater Point and Lodi, N. J.)
65	Dye Products and Chemical Co. (Inc.)	200 Fifth Avenue, New York City. (Newark, N. J.)
66	Dye Stuffs & Chemicals (Inc.)	Eleventh and Monroe Streets, St. Louis, Mo.
67	Eakins (Inc.), J. S. & W. R	24 Wallabout Street, Brooklyn, N. Y.
68	Eastman Kodak Co	343 State Street, Rochester, N. Y.
69	Essential Oil Co	Trenton, N. J.
70	Essex Aniline Works (Inc.)	88 Broad Street, Boston, Mass. (South Middleton, Mass.)
71	Fine Colors Co. (Inc.)	21-29 McBride Avenue, Paterson, N. J.
72	Florasynth Laboratories (Inc.)	Olmstead & Starling Avenues, Unionport, N. Y.
73	Foster-Heaton Co	27-31 Badger Avenue, Newark, N. J.
74	Franken Color Works, A	129 Fifth Avenue, New York City. (Chatham, N. J.)
75	Fries Bros	92 Reade Street, New York City. (Bloomfield, N. J.)

of manufacturers of dyes and other synthetic organic chemicals, 1922—Continued.

Name of company.	Office address (location of plant given in parenthesis if not in same city as office).
& Fries Co., The	1501-13 West Sixth Street, Cincinnati, Ohio.
eld Aniline Works (Inc.)	Midland Avenue, Garfield, N. J.
Chemical Co.	738 Broadway, Gary, Ind. (Chesterton, Ind.)
ill Chemical Corporation	157 Spencer Street, Brooklyn, N. Y.
uer Chemical Co., The	619 Bangor Building, Cleveland, Ohio.
rich Co., The B. F.	Akron, Ohio.
ame Chemical Co.	221 East State Street, Trenton, N. J.
ton Chemical Co.	350 Madison Avenue, New York City. (New Brunswick, N. J.)
selli Chemical Co., The	Guardian Building, Cleveland, Ohio. (Rensselaer, N. Y., and Grasselli, N. J.)
r & Merz Co., The	338 Wilson Avenue, Newark, N. J.
mann & Co., Morris	200 Fifth Avenue, New York City. (Newark, N.J.
len Chemical Co. of America (Inc.)	River Road, Garfield, N. J.
& Harrison Plush Co., The	Clark Mills, N. Y.
h Laboratories (Inc.)	593 Irving Avenue, Brooklyn, N. Y.
nd Aniline Co.	Holland, Mich.
er Electrochemical Co.	25 Pine Street, New York City.
Color Products Company, The	1636 Columbus Avenue, Sandusky, Ohio.
Dyestuff & Chemical Co.	595 East Seventh Street, South Boston, Mass.
ins & Son, James	239 Medford Street, Malden, Mass.
rocarbon Chemical Co.	951 East Orange Street, Lancaster, Pa.
on, Westcott & Dunning	Charles and Chase Streets. (1030 North Charles Street, Baltimore, Md.)
rial Color Works (Inc.)	Glens Falls, N. Y.
strial Chemicals Laboratory (Inc.)	Hammond, Ind.
national Chemical Products Co.	13 West Saratoga Street, Baltimore, Md. (Eureka, Mont.)
state Chemical Co.	667 Garfield Avenue, Jersey City, N. J.
Corporation, The C. E.	Flushing, Long Island., N. Y.
n Coal Tar Products Co. (Inc.)	11 Cliff Street, New York City. (Matawan, N. J.)
ucky Color & Chemical Co.	Thirty-fourth Street, south of Bank Street, Louisville, Ky.
Manufacturing Co., The	Central National Bank Building, Marietta, Ohio.
tein & Sons Co., E. C.	644 Greenwich Street, New York City. (Carteret, N. J., and South Charleston, W. Va.)
stamm & Co. (Inc.), H.	87 Park Place, New York City. (Brooklyn, N. Y.
view Laboratories	2 Jersey Street, Buffalo, N. Y.
otte Chemical Products Co.	13 West Saratoga Street, Baltimore, Md.
r & Co. (Inc.), F. G.	Maspeth and Gardner Avenues, Brooklyn, N. Y.
o., A.	Lawrence, Mass. (Methuen, Mass.)
Manufacturing Co., F. J.	2513 South Robey Street, Chicago, Ill.
Paint Co., Alston.	1031 Currier Street, Chicago, Ill.
& Co. (Inc.), John.	322 Race Street, Philadelphia, Pa. (Gibbsboro, N. J.)
ackrodt Chemical Works.	3600 North Second Street, St. Louis, Mo.
Color & Chemical Co., Max.	192-194 Coit Street, Irvington, N. J.
husetts department of public health.	Room 540, Statehouse, Boston, Mass.
Chemical Works.	204 Niagara Street, Newark, N. J.
rood Chemical Works.	Maywood, N. J.
am & Co., Geo. S.	Twentieth Street and Lynch Avenue, East St. Louis, Ill.
& Co.	45 Park Place, New York City. (Rahway, N. J.)
mac Chemical Co.	148 State Street, Boston, Mass.
Laboratories (Inc.), H. A.	122 Hudson Street, New York City. (Brooklyn, N. Y.)
-Edgar Co., The	110 William Street, New York City.
anto Chemical Works.	1724 South Second Street, St. Louis, Mo.
a Incorporated.	118 East Twenty-seventh Street, New York City. (Elizabeth, N. J.)
nal Ammonia Co. of Pennsylvania, The.	Delaware Avenue and Vankirk Street, Philadelphia, Pa.
nal Aniline & Chemical Co. (Inc.).	40 Rector Street, New York City. (Brooklyn and Buffalo, N. Y.; Marcus Hook, Pa.)
atuck Chemical Co., The.	Naugatuck, Conn.
ort Co., The.	P. O. Box 1582, Milwaukee, Wis. (Carrollville, Wis.)
England Aniline Works (Inc.)	95 Broad Street, Boston, Mass. (Ashland, Mass.)
Haven Gas Light Co.	80 Crown Street, New Haven, Conn.
York Color & Chemical Co. (Inc.)	Belleville, N. J. (Philadelphia, Pa.)
York Quinine & Chemical Works (Inc.)	152 William Street, New York City. (Brooklyn, N. Y.)
ra Alkali Co.	4205 Buffalo Avenue, Niagara Falls, N. Y.
ra Smelting Corporation.	Niagara Falls, N. Y.
Chemical & Color Works (Inc.)	152 West One hundred and eighth Street, New York City.
western Chemical Co.	Wauwatosa, Wis.
ll Chemical Corporation, The.	11 Cliff Street, New York City. (Perth Amboy, N. J.)
ry Electro Chemical Co.	Niagara Falls, N. Y.
o-Chemical Co.	1636 Columbus Avenue, Sandusky, Ohio.
ne Aniline & Chemical Corporation.	81 North Water Street, Poughkeepsie, N. Y.



PART V.

IPORTS AND EXPORTS OF THE WORLD'S CHIEF DYE-CONSUMING AND PRODUCING NATIONS FOR 1913, 1920, 1921, AND 1922.

INTRODUCTORY.

This section is a new feature of the census of dyes and coal-tar oducts published annually by the Tariff Commission. It presents atistics of imports and exports taken from foreign official publica-ns. The year 1913 is selected as a pre-war year for comparison th the post-war years 1920, 1921, and so far as figures are avail-le, 1922. The figures for the two periods furnish a basis for a tailed analysis of the international trade in dyes.

INTERNATIONAL DYE TRADE.

SUMMARY.

The world's annual production of coal-tar dyes previous to the ar approximated $90,000,000 in value. Figured at 25 cents per und, this was equivalent to about 360,000,000 pounds. In any ent it is reasonable to infer that the output exceeded 300,000,000 t was less than 400,000,000 pounds. The best available estimate the world's production by countries is contained in the following ble:[1]

World's approximate production of dyes by countries, 1913.

rmany	$68,300,000	Russia	$1,000,000
itzerland	6,450,000	Belgium	500,000
eat Britain	6,000,000	Netherlands	200,000
ance	5,000,000	Other countries	200,000
ited States	3,000,000		
stria	1,500,000	Total	92,150,000

The pre-war production of dyes by quantity and value is esti-ated by Grandmougin[2] as follows:

World's production of artificial dyes.

Dye.	Pounds.	Mean value.	Total value.
digo, 20 per cent	88,160,000	$0.175	$15,440,000
lphur black	33,060,000	.175	5,790,000
lphur dyes	11,020,000	.175	1,930,000
o dyes	132,240,000	.175	23,160,000
niline dyes	22,040,000	.525	11,580,000
thracene dyes	13,224,000	.525	6,948,000
her dyes	13,224,000	.263	3,474,000
Total	312,968,000		68,322,000

[1] Department of Commerce Special Agents Series 96, "Dyestuffs for American Textile and Other Indus-s:" Thomas H. Norton.
[2] Grandmougin: L'Essor des Industries Chimiques en France, 1919.

PRE-WAR PRODUCTION OF DYES.

Germany, with an output totaling three-fourths of all synthetic dyes produced, dominated the world's dye markets. Of the remaining quarter, over one-half was made from intermediates imported from Germany, and consequently the production of these dyes was dependent on that country. On the basis of the above, about 90 per cent of the world's dye production was controlled by Germany.

Switzerland, although without raw materials, ranked second, with about 7 per cent of the world's production. In 1913 Swiss exports of dyes were valued at over one-tenth of the dye exports of Germany. Practically all the raw materials required by the Swiss dye makers were of German origin. Great Britain, although possessing an abundant supply of coal-tar crudes, ranked far below the two preceding countries as a dye producer. At the beginning of the war she produced only one-tenth of her domestic requirements, which totaled about 40,000,000 pounds, with a value of $9,700,000. Official figures for 1907 show an output of 15,568,000 pounds, with a value of $1,815,205. In the manufacture of alizarin and several intermediates the British held a notable position.

France also possessed a synthetic dye industry; French-owned and operated plants manufactured from 10 to 15 per cent of the consumption of that country. In both France and Great Britain, as dye plants operated and owned by the German dye makers, final assembling operations were completed in the case of certain dyes made from German intermediates, in order to meet the patent requirements of those two countries.

In the United States just before the war a small dye industry produced dyes almost entirely from intermediates imported chiefly from Germany. The American industry of that period was in no sense self-contained or complete. The output in 1914 of 7 firms was 6,619,729 pounds, valued at $2,470,096.

Dye-consuming nations.—China leads the world as a consumer of dyes. The present estimated consumption of synthetic dyes by China (with indigo figured on the 20 per cent paste basis) exceeds 70,000,000 pounds. In 1913 Germany, Switzerland, and France exported to that country 69,761,276 pounds, valued at $11,673,917. In that year one-fifth of the total value of Germany's entire exports was taken by China. China used more indigo than all other nations of the world combined, and, because of the excessive use of blue color, continues to lead in its consumption.[3]

During 1913, 64 per cent of the German exports of indigo went to China, totaling 47,090,256 pounds, with an export value of $6,396,964. China consumes probably not more than 25 dyes in large quantities. The dyes consumed in the China trade are almost wholly those used on cotton and silk, as wool is used for clothing material only in negligible quantities. Among the basic dyes imported are Malachite green, Magenta, Methyl violet 2B, Methylene blue, Ba-

[3] Before the war the total production of indigo (100 per cent) was about 8,000 tons per year, to which should be added 2,000 tons of natural indigo. Of the 8,000 tons of synthetic, Germany produced about 7,000 tons. About 500 tons were consumed in Germany and the remainder exported. About 400 tons were made in France by the German branch factories. There was also production of indigo in England under similar conditions. The Swiss made about 400 tons. (France, Ministère du Commerce l'Industrie Française, vol. 2, 1919, p. 205.)

ck brown, Chrysoidine, and Auramine. There is considerable umption of the direct blues and reds, and of Croceine scarlet for ng silks and for paper staining. Sulphur black and a few other hur dyes are also imported into China.

he United States, with an average annual consumption of about 00,000 pounds, ranks second among dye-consuming countries. imports of 1913 were about 45,950,895 pounds. The United es is the largest consumer of fast vat dyes, chiefly for use on on. Great Britain ranks third among dye-consuming countries; present consumption is about 50,000,000 pounds.

he consumption of Germany is not accurately known, owing to the of official figures for that country. The annual consumption has variously estimated at from 33,000,000 to 55,000,000 pounds. post-war consumption, however, is probably below 40,000,000 nds per year. France has an annual consumption of 20,000,000 nds, and the British colonies, with India leading, have a combined umption of about 18,000,000 pounds per year. Italy, Japan, Switzerland follow in importance as dye consumers. Prior to war Russia and Austria-Hungary were both important con- ers of dyes; Grandmougin estimates that Russia consumed it 22,000,000 pounds and Austria-Hungary about 18,000,000 nds per year.

he tables at the end of this section give complete official figures xports and imports of each of the above-mentioned countries, ving the status of each nation as a producer and consumer of hetic dyes.

ABLE 21.—*Total imports of dyes into chief consuming countries, 1913 and 1921.*

Country.	1913		1921	
	Pounds.	Value.	Pounds.	Value.
digo	42,609,989	$7,032,205	46,939,187	$13,219,349
iline	(2)	3,943,329		
States[3]	45,950,895	7,537,870	4,252,911	5,156,779
Britain	41,203,008	9,207,684	6,600,160	6,333,162
-Hungary	17,168,764	3,616,199		
India[3]	16,923,607	3,741,031	10,842,191	12,779,646
	15,542,429	3,611,705	[4] 7,450,665	2,556,657
(aniline)	9,755,260	2,100,255	5,587,881	6,488,681
y	2,631,703	641,321		
	4,835,647	3,701,185		
	4,706,601	1,416,316	2,531,320	1,539,907
[3]	2,633,516	594,414		
ny	7,138,495	1,682,422		
n	2,376,166	699,737		
East Indies[4]	2,073,434	890,366		
rland	1,201,292	431,197	1,084,337	668,823

ports to China from France, Germany, and Switzerland amount to 69,761,276 pounds—$11,673,917.
al year 1914. Quantity from Norton's Special Agents Series No. 121. Value from Commerce and tion.
r ended March 31, 1914.
antity of synthetic indigo not shown.
stated.
ures include 3,496,275 pounds of reparation dyes for which no value is shown.

TABLE 22.—*Exports of dyes from Germany, 1913.*[1]

Country of destination.	Total artificial colors and intermediates.		Per cent age of quantity
	Tons.	*Pounds.*	Per cent.
China	29,821	65,743,376.60	23.8
United States	24,004	52,919,218.40	19.1
Great Britain	16,066	35,419,103.60	12.9
British colonies	8,510	18,761,146.00	7.8
Austria-Hungary	8,787	19,371,820.20	7.1
Italy	6,392	14,091,908.20	5.1
Russia	4,813	10,610,739.80	3.8
Japan	4,674	10,304,300.40	3.7
Switzerland	3,733	8,229,771.80	3.1
Netherlands	2,547	5,615,116.20	2.1
Dutch East Indies	1,783	3,930,801.80	1.4
France	2,920	6,437,432.00	2.4
Sweden	1,076	2,372,149.60	.9
Spain	909	2,003,951.40	.7
All others	9,420	20,767,332.00	7.5
Total	125,455	276,578,093.00	100.0

[1] From Rapport General sur L'Industrie Francaise, Part I, vol. 2, p. 204.

DEVELOPMENTS DURING AND AFTER THE WAR.

Soon after the beginning of the World War, the supply of dyes from Germany was shut off from other dye-consuming nations. After exhaustion of the stocks on hand there developed an acute shortage which threatened the textile and other industries dependent upon dyes for their operations. The prices of dyes rose to many times their normal level, and certain colors were not to be obtained at any price. These conditions stimulated an expansion by existing firms and the establishment of new firms, ultimately resulting in the manufacture of intermediates and dyes on a large scale in the United States, England, France, and, to a smaller extent, in Italy and Japan. Developments during the war were greatly hindered by lack of raw materials on account of the enormous demands for munitions.

PRESENT CONDITIONS AND FUTURE TENDENCIES.

The United States, Great Britain, and France are now producing from 80 to 90 per cent of their own requirements and have exported significant quantities of dyes to the Far East. Their extensive progress in dye manufacture during and since the war has broken, temporarily at least, Germany's monopoly in dye production. These countries depend upon Germany for a relatively small tonnage of dyes, and these are largely specialties. The world's post-war capacity to produce synthetic dyes greatly exceeds the normal requirements and is now nearly double the pre-war capacity. The newly created dye industries in the United States, Great Brit in, and Fran e are p otected by higher tariffs or by licensed control of imports. On the other hand, the German dye industry, with cumulative experience, lower manufacturing costs in plants built before the war and paid for by pre-war profits, offers a united front to the world under a powerful combination known as the I. G (Interessen Gemeinschaft). The three Swiss manufacturers have also formed an amalgamation. Sooner or later the German dye industry will return to a normal condition and severe industrial competition will probably follow between it and the dye

ustries of the United States, Great Britain, and France. There already been severe competition in the Far East markets, where 1921 Germany regained most of her trade. Later, it is probable t the Germans will strive to obtain a commanding place in the ne markets of the newly created industries. As the present export ces of German dyes are far above the pre-war levels, reduction in ces may be expected. A reduction in the prices of special types as yet highly developed in those countries would tend to dis- rage their production and at the same time prove an entering dge for competition with respect to products already made there. f present protective measures continue in the new dye-producing tions, Germany is likely to establish factories and seek industrial liations in those countries, as was the case in Italy. The Swiss dye nufacturers have already established plants in the United States d Great Britain. Governmental measures, in various ways designed stimulate dye manufacturing, will probably play an important part ring the next 5 to 10 years in the United States, Great Britain, and ance.

Another factor, important in the long run, is the progress achieved those countries in reducing manufacturing costs and in develop- new dyes, in contrast to the earlier methods of merely imitating es already in existence.

Both reduced costs and new color production hinge largely upon search, which in turn depends upon a large force of highly trained emists and technologists and a comprehensive program covering a riod of years. Furthermore, any nation with a large, self-con- ned industry will seek an outlet in export trade for many of its oducts in order to balance production as well as to avail itself of source of revenue. It is unwise to predict the results of the probable ture competition between the dye industries of the United States, eat Britain, France, and Germany. Many factors are involved d the final result is problematical. The dye famine during the orld War and the Ruhr occupation suggest the likelihood that e large industrial nations will endeavor to retain a considerable rtion of their newly developed dye industries to meet their essential mestic requirements, both in time of peace and for the emergen- s of national defense.

The dye industry is intimately associated with the manufacture many synthetic organic chemicals, among which are certain syn- tic medicinals essential to the public health.

The Swiss Dye Industry.

Switzerland is the only nation without the raw materials, coal d the products of the coking industry, possessing a well-developed d flourishing dye industry. Prior to the war its dye industry nked second to that of Germany, producing about 7 per cent the world's total output. The value of the coal-tar dye exports m Switzerland in 1913 was over 10 per cent of the toal value the exports of these products from Germany. At that time Swiss were dependent upon Germany for raw materials required the manufacture of dyes. The dye industry of Switzerland is ated at Basel. The four firms now manufacturing were founded evious to 1887 and the development of dye manufacturing

paralleled that of the German dye industry. Owing to their constructive accomplishments in research and to their efficient producing and merchandizing organization the Swiss have developed a good variety of dyes and have distributed them in all important world markets. During and immediately after the war, in the absence of German dyes, the Swiss industry had a period of great prosperity. The three large producers, Sandoz & Co., J. R. Geigy, and the Society for Chemical Industry, united their interests. The purposes of this combination, which is to last for 50 years, are: The advantageous purchase of raw materials, the marketing of finished products, and the pooling of profits. Branch firms for manufacturing colors have been established by the Swiss in Great Britain and the United States. The Swiss dye industry, as before the war, continues to be a notable factor in international trade.

RAW MATERIALS.

With the exception of salt, Switzerland does not possess coal or other mineral substances required in the chemical industry. For this reason dye making in that country does not represent a complete and self-contained industry. Prior to the war the German and Swiss dyemakers maintained relationships whereby the Swiss received nearly all their raw materials from the German dyemakers and participated to a considerable extent in the conventions and trade agreements of Germany. As Switzerland was entirely dependent upon foreign sources for the raw materials of the industry the origin of these since the outbreak of the war is of particular interest.

Official statistics of Switzerland show that Germany supplied, before the war, the vast majority of the crudes and intermediates imported by the Basel dye makers. This is illustrated by the figures for 1910 and 1911, when 83 to 85 per cent of "coal-tar derivatives and auxiliary materials used for aniline dye manufacture" came from Germany, together with about 98 per cent of "aniline compounds." After the outbreak of the war, demand was made upon Switzerland by Germany that exportation of dyes to all countries at war with Germany cease. The German manufacturers of intermediates, furthermore, notified Swiss dyemakers that unless dye exports to those countries ceased the supply of raw materials would be cut off. The German Government informed the Swiss Government that failure to comply with these demands would result in an embargo to Switzerland on German chemicals and medicinals. As a result of the refusal of Switzerland to comply with these demands the supply of crudes and intermediates from Germany ceased entirely, or at least was greatly reduced, and the Swiss were compelled either to seek other sources for their raw materials or to stop manufacture.

Great Britain was confronted with an acute dye shortage early in the war and supplied the Swiss manufacturers with crudes and intermediates, receiving in return finished dyes. The United States during the war made extensive developments in the production of crudes and intermediates, and were able to supply the Swiss certain materials. France also contributed a portion of the Swiss requirements. The new sources of raw materials were evident

Swiss imports of 1917–1918. In 1917, 24 per cent of "coal-derivatives and auxiliary materials used for aniline dye manufacture" was imported from Great Britain, and in 1918, 50 per cent. 917 of the "aniline compounds" 45 per cent came from the ed States and 44 per cent from Great Britain. Of the "benzyl ride, nitro-benzene, naphthol, etc.," imported, 39 per cent came the United States, 33 per cent from France, and about 23 per from Great Britain. In 1918, 60 per cent came from Great ain and 31 per cent from France.

wing to the exclusion of German dyes from the world's markets, Swiss dye industry enjoyed a period of unprecedented prosperity ng the war, and in 1920, before German dye manufacturers again active in the world's dye markets, Swiss exports reached maximum in the history of that industry. Since the war the s have obtained their crudes and intermediates from several ces and are no longer dependent upon a single country for materials. This is illustrated by the imports of 1921 and 1922. he former year, of the total imports of "coal-tar derivatives auxiliary materials used for aniline dye manufacture," about er cent came from the United States, 17 per cent from France, 15 per cent from England.

f the imports of "aniline" in 1922, 65 per cent came from Germany, er cent from Czechoslovakia, and about 8 per cent from Great ain. Of the "aniline compounds," 73 per cent came from Ger-y, 18 per cent from Great Britain, and 6 per cent from France. he "benzyl chloride, nitrobenzene, naphthol, etc.," 57 per cent e from Germany, 23 per cent from Great Britain, 12 per cent France, and 9 per cent from the United States. Detailed ort figures are given at the end of this section in the tables for les and intermediates for the years 1911 and 1922.

he supply of crudes and intermediates from Germany was greatly inished after the occupation of the Ruhr. The Swiss, however, ig to their connections with other countries, were able to obtain materials from France, Great Britain, United States, Italy, and nd.

n important Swiss development was the purchase of foreign dye ts; the Cincinnati Chemical Works, at Norwood and St. Bernard, , and the Clayton Aniline Co. (Ltd.), in England. The latter t is owned by three Swiss firms and manufactures dyes and mediates for them.

SWISS EXPORT TRADE.

ior to the war the Swiss had a valuable export trade in dyes to nany, the United States, Great Britain, British India, Belgium, a, and Italy. The total quantity of dyes exported by Switzer- in 1913 was 19,458,902 pounds, valued at $5,549,752. During war the quantity of exports increased and the value showed a large increase owing to the great scarcity and consequent high es of coal-tar dyes. In 1918, although the quantity of dyes orted was less, the value was over three times that of the year . In 1920, the year of maximum export of the Swiss dye stry, the quantity was 23,739,793 pounds, with a value reaching high figure of $35,411,115, over six times that of the pre-war 1913. In 1921, owing to the widespread business depression,

the reappearance of German dyes in the world's large markets and the low prices of reparation dyes, together with the new protective measures adopted by various foreign countries, the Swiss export trade showed a large decline to 10,779,612 pounds, valued at $11,654,516.

In 1922, however, owing to increased business activities in the dye-consuming countries, the exports increased to 16,167,655 pounds, with a value of $13,042,635. In that year the largest consumers of Swiss dyes were France, Great Britain, the United States, China, Japan, and Belgium.

A consideration of the Swiss export trade is not complete without special mention of indigo. The total exports of indigo in 1913 were 3,950,202 pounds, valued at $754,792. China, the largest consumer of indigo, received 72 per cent of this quantity. Before the war the world's production of synthetic indigo was dominated by Germany, Switzerland being the only competitor. The exports of Germany for 1913, according to official figures, totaled 73,530,024 pounds, with a value of $12,690,874. Of this China received 47,090,256 pounds, valued at $6,396,964. In 1917 Swiss exports of indigo totaled 3,246,274 pounds and in 1920, 5,027,149 pounds, 90 per cent of which was sent to China. In 1921, the year of business depression, the total exports decreased to 2,607,823 pounds. In 1922, however, the exports of indigo showed a large increase, totaling 7,629,680 pounds, valued at $2,508,441, of which China received 6,822,796 pounds, valued at $1,896,487. This quantity is 14.5 per cent of the German export of indigo to China in 1913.

These figures indicate a recent increased capacity of Swiss indigo plants compared with the pre-war years, and also show the prominence of the Swiss product in the Far East market.

TABLE 23.—*Imports of intermediates into Switzerland, 1911 and 1922.*

	1911		1922	
	Pounds.	Value.	Pounds.	Value.
Derivatives of coal tar—carbolineum:				
Germany	1,998,470		3,517,660	$17,[illegible]
France			9,259	[illegible]
Great Britain			1,764	[illegible]
Other countries	46,076		22,928	1,[illegible]
Total	2,044,546	$19,689	3,551,611	[illegible]
Derivatives of coal tar and auxiliary materials for manufacture of aniline colors:				
Germany	5,247,830		1,695,117	[illegible]
Austria-Hungary	104,278			
Austria			375,221	[illegible]
France	325,619		493,610	[illegible]
Great Britain	433,424		545,418	[illegible]
United States			940,041	[illegible]
Belgium			113,096	[illegible]
Poland			50,926	[illegible]
Italy			11,684	[illegible]
Other countries	21,164		265,213	[illegible]
Total	6,132,315	298,876	4,490,328	[illegible]
Aniline:				
Germany	1,877,437		1,820,338	[illegible]
France	220		66,579	[illegible]
Great Britain			240,301	[illegible]
Czechoslovakia			639,554	[illegible]
Other countries			24,471	[illegible]
Total	1,877,657	167,666	2,791,243	[illegible]

23.—*Imports of intermediates into Switzerland, 1911 and 1922*—Continued.

	1911		1922	
	Pounds.	Value.	Pounds.	Value.
ounds:				
	2,116,416		507,940	$55,637
	3,307		40,785	10,243
ltain	24,471		122,355	23,435
tates			4,630	1,065
			17,416	4,425
ntries	1,323		5,952	1,475
	2,145,517	$458,216	699,078	96,280
—resorcin:				
	122,355		48,281	9,997
lungary	50,926			
	2,205		5,071	1,393
			51,367	4,998
ntries			5,071	492
	175,486	44,653	109,790	16,880
:				
	46,738		124,780	10,734
	44,533		55,997	6,227
ntries	11,023		33,510	1,393
	102,294	14,328	214,287	18,354
le, nitrobenzol, naphthol:				
	1,772,719		606,706	36,136
lungary	57,099			
	1,323		126,324	12,373
tain	441		249,781	29,416
tates			100,089	4,425
			36,455	4,507
ntries				
	1,831,582	237,652	1,060,000	86,857

ABLE 24.—*Exports of dyes from Switzerland, 1913, 1920, and 1921.*

	1913		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
l and artificial:	*Pounds.*		*Pounds.*		*Pounds.*	
tain			53,792	$45,911	4,630	$5,899
	1,102	$767	2,205	5,068	46,297	12,839
	80,247	11,931	58,863	27,949	3,748	3,470
	235,892	37,436	44,974	41,122	14,991	3,644
ds	18,739	3,601	22,487	12,171	661	174
	55,556	20,983		350		
nia			9,480	33,112		
	33,069	8,004				
			14,109	14,448		
	5,071	3,314				
	882	145				
	5,291	3,212	6,614	15,129	26,676	62,807
dia	2,646	394	441	306	23,589	11,708
s	45,194	6,742	46,297	21,410	56,879	27,066
	2,845,698	493,081	4,511,714	2,176,503	2,192,916	1,124,627
	143,960	84,781	39,242	89,746	145,504	344,398
ates	476,855	71,401	149,692	68,530		
			67,240	31,839	63,713	31,404
ntries					28,219	19,606
	3,950,202	754,792	5,027,149	2,583,595	2,607,821	1,647,730

TABLE 24.—*Exports of dyes from Switzerland, 1913, 1920, and 1921*—Continued.

	1913		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Aniline, anthracene, naphthalene, and other coal-tar dyes, n. s. p. f.:	*Pounds.*		*Pounds.*		*Pounds.*	
Germany	3,586,223	$1,126,770	661	$1,215	3,527	$3,807
Austria-Hungary	711,645	211,085	9,700	13,324	18,519	17,871
France	309,967	174,238	3,165,585	8,267,993	1,485,900	2,238,762
Italy	1,386,032	401,320	1,414,030	1,793,802	578,708	576,367
Belgium	764,335	211,372	1,191,807	2,596,639	496,476	446,418
Holland	169,975	47,310	223,767	344,230	166,227	153,540
Great Britain	1,879,202	640,607	7,572,360	10,535,726	1,376,332	1,831,480
Russia	313,715	229,626	15,212	30,395		
Sweden	188,052	59,490	524,915	728,078	100,971	92,822
Norway	38,801	13,237	32,628	59,650	11,905	11,972
Denmark	157,849	47,909	206,571	323,212	108,687	118,674
Portugal	101,632	29,160	98,546	134,065	47,840	48,457
Spain	175,045	61,624	518,301	764,293	207,232	208,700
Greece	8,157	2,885	82,673	153,462	17,637	22,982
Mesopotamia			2,646	4,515		
Serbia	441	131			1,984	2,778
Bulgaria	11,464	3,701	47,840	74,896	50,265	41,987
Rumania	882	342	4,189	6,464	25,353	20,994
European Turkey	4,850	1,157	24,912	45,320	2,425	2,256
Egypt	20,503	3,654	16,535	30,492	13,448	18,565
Algeria and Tunis	3,968	1,334	8,157	11,624		
South Africa	661	253	1,323	2,795		
Straits, etc			1,764	2,445		
Asiatic Turkey	11,905	3,037				
British India	1,090,175	244,435	306,219	578,026	645,096	571,509
Siam	28,880	5,086	4,850	7,387		
Indo-China					3,527	4,666
French Indies			7,055	20,827		
East Indies	1,543	240	7,937	13,177	17,416	20,372
Philippines			220	324		
China	589,069	89,528	188,273	419,382	46,517	73,126
Japan	767,862	242,099	324,517	678,447	307,542	427,132
Canada	144,401	41,620	86,420	144,062	94,798	102,765
Cuba				135		
United States	2,815,274	800,368	1,447,540	2,699,272	1,500,451	1,961,071
Colombia			3,086	4,826		
Mexico	49,604	17,722	208,776	426,076	80,247	106,447
Central America	9,700	2,188	220	351		
Syria					661	869
Brazil	91,932	55,605	402,780	940,656	39,021	64,589
Argentina	53,351	17,941	179,675	327,383	42,990	47,192
Chile			30,203	53,657	7,275	11,798
Rest of South America	882	363	1,543	3,302		
Rest of Asia			9,039	16,801		
Australia	12,346	3,105	161,597	269,940	9,700	13,333
Oceania			661	1,091		
Baltic countries			32,628	55,854	14,991	22,729
Poland			14,330	32,422	227,163	353,393
Czechoslovakia			104,057	166,280	302,692	256,998
Hungary			1,323	2,684		
Yugoslavia			24,912	39,180		
Morocco			661	1,343		
Other countries	8,377	4,418			18,298	27,980
Total	15,508,700	4,794,960	18,712,645	32,827,520	8,171,791	10,108,780

TABLE 25.—*Imports of dyes into Switzerland, 1913, 1920, and 1921.*

	1913		1920		1921	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Alizarin, artificial:	*Pounds.*		*Pounds.*		*Pounds.*	
Germany	505,074	$61,903	229,058	$59,199	221,562	$47,712
Great Britain	3,527	432	.....	.....	.....	.....
Austria	.....	.....	2,425	785	.....	.....
Czechoslovakia	.....	.....	3,968	878	70,547	14,227
Others	.....	.....	.....	.....	1,323	174
Total	508,601	62,335	235,451	60,862	293,432	62,113
Aniline, anthracene, naphthalene, and other coal-tar dyes, n. s. p. f.:						
Germany	1,476,641	426,596	1,092,600	1,363,930	726,467	578,796
Austria-Hungary	220	64	441	534	8,620	5,379
France	8,377	2,420	22,487	17,669	1,604	3,123
Italy	5,512	1,592	441	1,721	2,406	1,735
Belgium	23,148	6,687	441	319	.....	173
Spain	.....	.....	.....	.....	.....	173
Netherlands	441	127	441	302	.....	.....
Great Britain	24,912	7,197	9,480	12,359	1,002	868
Czechoslovakia	.....	.....	3,748	907	3,207	521
United States	.....	.....	10,362	25,183	200	173
Total	1,539,251	444,683	1,140,441	1,422,924	743,506	590,941
Indigo, natural and artificial:						
Germany	152,558	24,040	155,865	61,329	46,297	15,268
France	882	139	.....	.....	.....	.....
Italy	.....	.....	.....	.....	1,102	521
Total	153,440	24,179	155,865	61,329	47,399	15,789

TABLE 25a.—*Dyes—Imports into and exports from Switzerland, 1922.*

	Imports.		Exports.	
	Pounds.	Value.	Pounds.	Value.
Alizarin, artificial:				
Germany	132,496	$23,830	.....	.....
Czechoslovakia	22,266	4,957	.....	.....
Total	154,763	28,787	.....	.....
Aniline colors and not otherwise named coal-tar dyes:				
Germany	993,393	568,298	18,078	$22,305
France	13,007	11,057	2,155,437	2,646,274
Italy	38,801	30,121	356,484	381,089
Belgium	.....	.....	723,550	486,704
Great Britain	14,771	8,769	1,734,138	2,494,524
Spain	.....	.....	163,802	248,595
Sweden	.....	.....	235,451	226,671
Czechoslovakia	.....	.....	183,643	154,609
Japan	.....	.....	228,617	259,842
United States	.....	.....	1,568,132	2,420,747
Other countries	20,944	8,198	1,170,643	1,192,834
Total	1,080,915	626,443	8,537,975	10,534,194
Indigo, indigo solution:				
Germany	53,285	16,394	.....	.....
France	1,764	763	9,480	10,104
Belgium	.....	.....	51,588	10,866
Egypt	.....	.....	64,595	35,268
British India	.....	.....	136,465	37,175
East Indies	.....	.....	52,469	15,632
China	.....	.....	6,822,796	1,896,487
Japan	.....	.....	363,759	430,846
Other countries	66	382	128,528	72,062
Total	55,115	17,539	7,629,680	2,508,441

The French Dye Industry.

The manufacture of dyes in France prior to the war was not extensively developed. About 10 to 15 per cent of the consumption was made in French-owned and operated dye factories.[1]

The three principal sources of dyes consumed in that period were (1) imports from Germany, (2) dye-assembling factories in France controlled by German dye manufacturers, (3) French-owned and operated factories. Official figures for 1913 show that France imported 4,706,601 pounds of dyes with a value of $1,416,316. Of this total quantity about 86 per cent came from Germany and about 9 per cent from Switzerland. The total value of dyes produced in the German-controlled factories located in France was about $2,000,000 and the value of the dyes made in French-owned and operated factories was about $600,000.[4]

In 1913 only one French firm was capable of manufacturing intermediates used in the preparation of dyes, namely, the Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, formerly Poirrier. The other dye factories of France, as was the case in the United States, depended upon intermediates imported almost entirely from Germany. Imported crudes came largely from Germany and Great Britain (see Table 26). Crudes from the French gas works were purchased by the German dye manufacturers and returned to France in the form of intermediates. German dye firms operated six branch plants in France. Leopold Cassella, of Frankfort on the Main, and Die Aktien Gesellschaft für Anilin Fabrikation, of Berlin, had factories at Lyon; Die Badische Anilin und Soda Fabrik had a branch plant at Neuville-sur-Saone, the Bayer Co. and Weiler-ter-Meer had factories near Lille; and Meister Lucius and Brüning, of Höchst, had a plant at Creil. In these branch plants the final steps of dye preparation were carried out, utilizing intermediates produced in and imported from Germany. In addition to the German plants, the Swiss firm, Society of Chemical Industry of Basel, had a branch at St. Fous, and the Geigy Co., of Basel, operated a branch at Maromme, near Rouen. These branch plants enabled the foreign dye manufacturers to meet the French patent requirements on patents taken out by foreign chemical firms in France. To illustrate the method of operation of these branch plants: In the case of indigo, the phenyl-glycine compound was manufactured in Germany and converted to indigo in a branch plant in France. Thus the trade secrets were kept in possession of the German dye manufacturers and the complex and fundamental operations involved in the preparation of the intermediates were centralized in the big German dye plants. Another factor favoring the operation of branch plants was the French tariff, which favored the importation of intermediates rather than dyes, as the specific duty on the former was considerably lower than the specific duty on dyes. The Germans were also able to ship these dyes, whose manufacture had been completed in their French plants, to French colonies, free of duty.

[1] Enquete Production Française et la Concurrence Etrangère, Vol. III, p. 145.
[4] France Ministère du Commerce L'Industrie Française, Vol. II, 1919, p. 206.

To reduce further the duty paid on dyes entering France, the rmans imported highly concentrated dyes to their branch plants, ere they were diluted with salt or dextrin, in some cases up to 500 cent of their original weight, before shipment to the textile mills other dye consumers. That these German-controlled branch plants re a precarious asset in an emergency became evident within a weeks after the outbreak of the war, when they ceased operations d were no longer able to supply the French textile industry.

Early consideration of the problem of dye production in France phasized the necessity of intermediate manufacture and of techni- lly experienced men for supervision and research. Many of the old e plants were used during the war for the manufacture of explo- es. Advancement was made, however, in French dye making ring the war. It was far less rapid than the progress made in both e United States and Great Britain. The simpler types of dyes, h as azo colors and sulphur dyes, were made to meet the bulk uirements for military and other uses. Technical information was hanged with the dyemakers of Great Britain. The dye shortage s partly met by increased imports from Switzerland. Toward the l of the war, and particularly after the signing of the armistice, manufacture of dyes progressed more rapidly in both the old and newly organized dye-making plants.

The production in 1919[5] is estimated at 3,000 metric tons (about 00,000 pounds), made up of about 21 per cent indigo, 36 per cent phur dyes, and the remainder principally of azo colors. In 1920, year of great business activity, the French production was about 00 metric tons, or 16,280,000 pounds. Indigo constituted 40 per t of the total output of that year; the azo colors made up 35 per t; the sulphur dyes, 21 per cent; and the di- and tri-phenyl- thane dyes constituted 1 per cent of the total production. These re of particular importance to the silk industry. The vat and zarin dyes had not appeared. The output in 1921 represented etter balance on the basis of domestic requirements. The total proximated 5,900 metric tons, or about 13,000,000 pounds, of ich 45 per cent was indigo and 32 per cent azo dyes. Di- and tri- enylmethane dyes increased to 3 per cent, and alizarin appeared the first time, constituting 1.4 per cent of the total output. e vat dyes, however, were not reported. The average monthly oduction in the early part of 1922 was estimated at 670 metric ns; the di- and tri-phenylmethane colors made up 5 per cent, zarin dyes 4 per cent. Imports were estimated at about 15 per t of the consumption, indicating that France produced most of r domestic requirements.

Imports.—As previously stated, the French imports of dyes in 13 totaled 4,706,601 pounds valued at $1,416,316, made up of zarin, 771,169 pounds valued at $270,046; other dyes derived m coal tar, 3,847,247 pounds valued at $1,084,510; and indigo, ,185 pounds valued at $61,760.

The post-war imports consisted of reparation dyes from Germany large amounts and the imports of dyes from Germany and Switzer- d through commercial channels. In 1920 the imports of coal-tar

[5] The figures on production in France are taken from *Chimie et Industrie*, 1923 (January), p. 180.

dyes, dry, were 10,331,638 pounds valued at $12,202,319, and 2,649,708 pounds in paste form, valued at $1,091,909. Full details of these imports by country of origin and chemical class may be found in Table 26. Germany was the chief source and Switzerland was the next largest. In 1921 the imports declined to 2,104,071 pounds, valued at $1,279,905, in dry form and 427,249 pounds, valued at $260,002, in paste form.

Exports of dyes in 1913 totaled 1,152,134 pounds valued at $275,716, made up of "coal-tar dyes other than alizarin," 916,902 pounds, valued at $207,896, of which 63 per cent was shipped to Indo-China; "indigo paste," 164,023 pounds valued at $17,949, 81 per cent of which went to French colonies; and lastly, "indigo," 71,209 pounds, valued at $49,871. The Germans operated and owned branch plants in France and were able to ship, duty free to the French colonies, dyes made in France. This undoubtedly accounts for a considerable part of this export trade.

In 1920 and 1921 exports of indigo constituted the greater part of the total dyes exported. China was the chief consumer. For 1920, the exports of coal-tar dyes, dry, were 2,019,413 pounds valued at $3,138,898. Of this quantity 73 per cent was indigo. The exports of coal-tar dyes in paste form were 4,053,818 pounds valued at $1,612,610; of this quantity 98 per cent was indigo. In 1921 the exports of coal-tar dyes, dry, were 5,567,275 pounds valued at $1,505,571; of this quantity 4,725,340 pounds was indigo. The figures for paste dyes were relatively small—379,856 pounds valued at $102,737.

TABLE 26.—*Imports of coal-tar crudes and intermediates into France, 1913.*

	Pounds.	Value.		Pounds.	Value.
Crudes:			Intermediates:		
Great Britain	65,167,535		Great Britain	150,354	
Germany	84,665,017		Germany	7,790,615	
Holland	467,816		Belgium	198,414	
Belgium	36,267,875		Switzerland	237,215	
Switzerland	768,083		Austria-Hungary	15,432	
Spain	1,080,474		Other countries	25,794	
United States	1,653,891				
Other Countries	27,116		Total [1]	8,422,233	$1,140,65
			Corrected total	8,417,824	
Total	190,097,807	$3,744,442			

[1] Published total incorrect.

LE 26a.—*Coal-tar dyes—Imports into and exports from France, 1913.*

Dye.	Imports.		Exports.	
	Pounds.	Value.	Pounds.	Value.
cial:				
tain	8,598			
	762,571			
	771,169	$270,046		
erived from coal tar:				
tain	87,082		40,345	
	3,263,249		35,053	
ds	30,864			
	46,076		48,943	
nd	410,276		19,621	
	1,323		40,565	
			17,196	
dia			3,307	
			22,487	
			3,086	
ates			15,873	
			32,188	
			17,857	
s			580,036	
tish colonies			22,267	
ign countries	8,377		18,078	
	3,847,247	1,084,510	916,902	$207,896
tain	3,968			
	1,323		11,243	
dia	76,280			
			7,496	
			2,425	
			1,764	
			8,157	
			6,173	
tish colonies			10,803	
ntries	6,614		23,148	
	88,185	61,760	71,209	49,871
indigo in balls of blue:				
			2,205	
nd			2,866	
ssessions in Africa			22,487	
tish colonies			133,819	
ntries			2,646	
			164,023	17,949

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TABLE 27.—*Imports of coal-tar dyes into France, 1920, 1921.*

Class.	1920										1921	
	Great Britain.	Germany.	Belgium.	Switzerland.	United States.	Italy.	Holland.	All others.	Total. Pounds.	Total. Value.	Pounds.	Value.
DRY.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Nitroso	11,023	73,854	5,291	33,289	.....	.....	.....	882	124,339	$70,542	13,228	$8,046
Nitro	9,921	.....	3,307	.....	8,818	.....	.....	1,543	23,589	20,919	1,323	819
Pyrazolone	.....	6,614	2,646	88,845	3,086	.....	.....	3,748	104,939	117,455	55,776	33,897
Stilbene	.....	9,700	.....	85,098	9,921	5,952	.....	441	111,112	98,620	30,203	18,401
Monoazo	74,515	341,933	.....	732,589	58,424	.....	.....	15,212	1,222,892	1,168,086	458,116	278,630
Polyazo	74,956	1,768,089	.....	868,833	305,337	.....	30,423	47,400	3,095,038	2,292,944	809,750	492,519
Thiobenzenyl	6,614	4,850	.....	20,503	.....	.....	.....	1,322	33,289	35,514	11,243	6,854
Sulphur	104,278	72,972	.....	223,326	.....	430,358	.....	2,866	834,000	432,498	102,955	62,654
Indo phenol	.....	1,651,686	.....	206,130	24,030	.....	.....	45,636	1,927,482	3,639,784	109,128	66,379
Azines	230,601	110,230	.....	46,517	91,711	.....	.....	5,953	485,012	382,250	58,642	35,685
Pyronines	.....	2,866	.....	31,306	.....	.....	661	.....	34,833	101,609	18,078	11,026
Eosines	4,630	13,889	661	18,960	.....	.....	.....	.....	38,140	83,400	8,598	5,215
Diphenyl methane	32,187	220,019	.....	568,346	29,542	.....	.....	40,564	890,658	1,804,845	283,732	172,616
Acridines	.....	4,409	.....	17,416	2,205	.....	.....	2,866	26,896	42,951	27,557	16,762
Hydroquinones	5,732	810,411	.....	.....	.....	.....	.....	2,205	818,348	1,039,442	35,715	21,754
Indigotines	6,173	529,765	.....	2,866	.....	.....	.....	3,748	542,552	812,455	11,905	7,226
Insoluble vat colors other than indigo	.....	7,937	.....	6,393	.....	.....	.....	1,543	15,873	42,325	57,099	34,717
Cibanones	2,426	220	.....	.....	.....	.....	.....	.....	2,646	16,680	11,023	6,705
Total	.....	.....	.....	.....	.....	.....	.....	.....	10,331,638	12,202,319	2,104,071	1,279,905
PASTE.												
Nitroso	.....	4,630	.....	220	.....	.....	.....	34,833	39,683	8,270	.....	.....
Nitro	.....	220	.....	.....	.....	.....	.....	.....	220	69	.....	.....
Pyrazolone	.....	220	.....	.....	.....	.....	.....	.....	220	69	441	298
Monoazo	1,543	25,794	.....	56,217	.....	.....	.....	.....	83,554	28,703	9,259	5,662
Polyazo	.....	54,674	.....	.....	.....	.....	.....	30,424	85,098	28,842	119,489	72,712
Sulphur	13,488	.....	.....	.....	.....	27,778	.....	.....	41,226	10,425	.....	.....
Indo phenol	.....	291,889	.....	197,532	.....	.....	.....	35,715	525,136	247,489	34,612	21,083
Azines	.....	19,621	.....	8,157	4,189	.....	.....	661	32,628	15,429	3,086	1,862
Pyronines	.....	441	.....	.....	.....	.....	.....	.....	441	347	220	149
Eosines	1,323	2,645	.....	.....	.....	.....	.....	.....	3,968	2,154	1,764	1,043
Diphenyl methane	.....	55,556	.....	.....	.....	.....	.....	1,323	56,879	28,842	11,243	6,854
Hydroquinones	22,266	358,902	.....	4,409	.....	.....	.....	.....	295,637	88,056	63,052	38,367
Indigotines	10,362	1,334,884	.....	38,140	.....	.....	.....	.....	1,383,386	553,845	99,868	60,717
Insoluble vat colors other than indigo	220	27,337	.....	42,328	.....	.....	.....	30,424	100,309	77,284	67,240	40,900
Cibanones	.....	.....	.....	1,323	.....	.....	.....	.....	1,323	2,085	16,975	10,355

Class.	1920									1921	
	Great Britain.	Germany.	Belgium.	Switzerland.	United States.	Italy.	All others.	Total.		Pounds.	Value.
								Pounds.	Value.		
DRY.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Nitroso	12,125		441				17,637	30,203	$17,166	79,366	$21,456
Nitro	441			3,749			220	4,410	3,892	441	149
Pyrazolone				3,307	2,425		220	5,952	6,672	2,205	596
Stilbene							3,086	3,086	1,390		
Monoazo			9,039	5,732			5,291	20,062	11,097	5,291	1,415
Polyazo				2,205		2,205	7,936	12,346	6,116	29,101	7,897
Thiobenzenyl										881	224
Sulphur			35,494				21,826	57,320	29,746	38,139	10,281
Indophenol	220			4,410				4,630	8,757	2,425	670
Azines							661	661	556	1,543	447
Pyronines	4,850					1,543	5,291	11,684	34,055	661	149
Eosines										1,763	447
Diphenylmethane	28,880		108,466		1,543	21,164	153,441	313,494	635,300	615,083	166,433
Acridines										441	149
Hydroquinones	1,984					22,487	2,866	27,337	34,750	24,691	6,705
Indigotines			245,813		358,468		877,651	1,481,932	2,219,135	4,725,340	1,277,750
Insoluble vat colors other than indigo			1,323	2,210			44,533	46,076	122,876	37,699	10,207
Cibanones							220	220	1,390	2,205	596
Total								2,019,413	3,138,898	5,567,275	1,505,571
PASTE.											
Nitroso		10,141	9,039			3,968	31,306	54,454	11,329	32,408	8,791
Pyrazolone										2,646	745
Monoazo			441					441	139	11,905	3,204
Polyazo						220	4,630	4,850	1,668	22,267	6,035
Sulphur		440	2,646					3,086	765	6,393	1,714
Indophenol										441	149
Azines	220				1,323			1,543	765		
Pyronines										1,102	298
Diphenylmethane			1,102			3,527	11,685	15,314	8,270	44,092	11,920
Hydroquinones			7,936				2,205	10,141	2,989	107,806	29,129
Indigotines			349,650		1,182,107		2,431,012	3,962,769	1,586,546	149,914	40,528
Insoluble vat colors other than indigo				220				220	139		
Cibanones										882	224
Total								4,053,818	1,612,610	379,856	102,737

Dye Industry of Great Britain.

Great Britain occupies a peculiar position in regard to the synthetic dye industry. This very important branch of organic chemistry was initiated with the discovery of Mauveine, in 1856, by W. H. Perkin, and this color was soon produced on a commercial scale. Researches were subsequently conducted by the Royal College of Chemistry, and up to about 1875 the manufacture of artificial dyes prospered in England.

Professor Hofmann and other German chemists, who had familiarized themselves with the research and industrial methods pursued in England, returned to Germany, where the significance and promise of this field was fully appreciated. The reasons for the gradual loss of the dye industry by England and the commercial success of Germany were many; the chief, however, was the eleborate and extensive chemical research conducted by German chemists. Other factors were: (1) The patent laws of both countries were unfavorable to the British firms, and favored the German manufacturers; (2) tax-free alcohol in Germany at a critical period enabled the Germans to produce certain dyes at a lower cost; (3) later, the highly organized German corporations made possible joint action on purchase, exchange of materials, patent protection, research, and merchandising of finished articles.

The position of the British dye industry immediately prior to the war is indicated by its production, according to estimates, of about 10 per cent of the consumption of Great Britain, whereas about 90 per cent of the dyes used were imported, largely from Germany. The pre-war consumption of Great Britain is estimated at about 20,000 tons per year and the consumption for 1920 at 25,000 tons. In 1913 the total imports of coal-tar dyes were 41,203,008 pounds, with a value of $9,207,684. There were about 6 firms in England manufacturing dyes in 1913. Production in 1907 as reported by "First Census of Production of the United Kingdom, 1907" (printed 1913), was 139,000 hundredweight (15,568,000 pounds), valued at £373,000 ($1,815,204). The program of the British dyemakers included a limited variety of acid, direct, basic, sulphur, and certain other dyes of the simpler types. The position of the British dye manufacturers of alizarin, however, was a noteworthy exception. Owing to the competition offered by English manufacturers, German manufacturers were compelled to admit the British to the alizarin convention. In 1882 the British Alizarine Co. (Ltd.) was established to specialize in the manufacture of alizarin. This concern was practically owned by the United Turkey Red Co., the Calico Printers Association, and other consumers of dyes. The British producers of aniline oil and sulphur black also entered into national conventions dominated by German influence. H. acid, Gamma acid, and Cleve's acid of English manufacture were exported to Germany over 20 years ago, showing that the preparation of certain coal-tar products was well established in Great Britain.

The key to a self-contained dye industry is the manufacture of intermediates. Any extensive developments in the intermediate program of the British dye manufacturers were vigorously discouraged by the Germans who sold such products in England at or below cost. The sales methods and organization of the foreign dyemakers made

ely difficult for the British manufacturer to introduce new

n firms owned two dye plants in England. The Ellesmere rks, where final stages of indigo manufacture were carried operated by Meister, Lucius & Brüning, and the Mersey Works, where the preparation of certain other dyes was d, was owned jointly by three German firms. These fac- re primarily operated in order to comply with the British ct of 1907. The essential intermediates were produced in ; hence these dye factories in England in no sense repre- self-contained dye industry. In the early part of the war textile industry of Great Britain was threatened with a dye Fortunately the Swiss dyemakers were able to supply ble quantities of dyes to Great Britain. Prior to the war dye industry had relied almost entirely upon Germany for rials. Demand was made upon the Swiss by Germany to portation of dyes to the countries at war with Germany reat of stopping shipments of intermediates and chemicals. ss manufacturers refused to comply with this demand. e Board of Trade, an English governmental department, crudes and certain other products to the Swiss, in return England received manufactured dyes. This supply was of nt importance to the British textile industry.

ous war demands for munitions restricted the supply of toluene, phenol, "mixed acid," and certain chemicals re- the preparation of colors. The early realization of the ce of the domestic dye industry in the event of a protracted o the organization of the British Dyes (Ltd.) in 1915.

gly, in 1915[6] British Dyes (Ltd.) was formed, the Government under- lvance on debenture to the company a sum of £1 for every £1 of ordinary al subscribed up to £1,000,000, and thereafter a further pound sterling of additional share capital subscribed up to a maximum of £500,000. e amount originally contemplated was eventually subscribed, the com- l have a capital of £4,500,000 made up of £3,000,000 ordinary capital e users and £1,500,000 Government debentures. The loan of £200,000 romised by the Government to Read Holliday & Sons (Ltd.) for develop- ses was ultimately confirmed to British Dyes (Ltd.), and consequently due from the Government on debenture security was raised to £1,700,000. was to bear interest at 4 per cent per annum and to be repayable in 25 nterest for the first 5 years being payable only out of profits and non- . The dividend payable by the company was limited to 6 per cent per ong as any portion of the Government advance was outstanding. The t also granted to the company the sum of £100,000 for research purposes, as and when required over a period of 10 years. There were to be two t directors on the board and provision was made in the articles of associa- re the permanent British character of the company and to give the Gov- right of intervention if the prices charged by the company were unreason- re were any unreasonable differentiation in the distribution of its products. mpany acquired, at the outset, the undertaking of Messrs. Read Holliday .), of Huddersfield, and negotiations were entered into for the acquisition evinstein (Ltd.), of Manchester, but these negotiations were unsuccessful.

ogress of this new corporation was considerably hindered ct that its capacity to a large extent was utilized for the ure of explosives.

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dyes and dyestuffs prepared by subcommittee appointed by the standing committee on

Messrs. Levinstein (Ltd.), of Manchester, acquired the works of Messrs. Claus & Co., of Manchester, in 1916, and later, under the Trading with the Enemy Act, the Ellesmere Port Works, formerly owned by the German firm of Meister, Lucius & Brüning, where the manufacture of synthetic indigo was finally developed. Levinstein produced a limited variety of dyes of great importance to the textile industry. The activities of the British Alizarine Co. were greatly hindered by the Silvertown explosion in 1917 at an adjoining plant. Scottish Dyes (Ltd.), of Carlisle, and other firms made notable progress in the preparation of dyes. In 1918 Great Britain was producing many of the bulk colors satisfactory for military and certain other requirements. Very little development had been made, however, in the production of the more complex and special dyes. The British Dyestuffs Corporation (Ltd.), formed in July, 1919, controlled both the British Dyes (Ltd.) and Levinstein (Ltd.).

* * * The corporation was formed with an authorized share capital of £10,000,000, divided into 4,500,000 preference shares of £1 each, 4,500,000 preferred ordinary shares of £1 each, and 1,000,000 deferred ordinary shares of £1. The Government subscribed for 850,000 preference and 850,000 preferred ordinary shares in substitution for the loan on debentures to British Dyes (Ltd.) of £1,700,000, to which they were committed. The vendor companies—(British Dyes,(Ltd.) and Levinstein (Ltd.)—received 756,481 preference, 727,281 preferred ordinary, and 980,044 deferred ordinary shares, these latter being in payment for the good will, patent, and other rights of the two concerns, whilst 2,500,000 preference and 2,500,000 preferred ordinary shares were offered for public subscription. The new corporation acquired practically all the shares of British Dyes (Ltd.) and Levinstein (Ltd.).[7]

This company is reported to have produced about 75 per cent of the annual output of dyes in the United Kingdom. In 1920 the output of the concern was about 16,000 tons.[8] Brotherton & Co. (Ltd.), who purchased under the Trading with the Enemy Act the Mersey Chemical Works, formerly owned by three German dye producers, developed a variety of wool and cotton dyes. The Clayton Aniline Co. (Ltd.), jointly owned by three Swiss dye concerns, the Society of Chemical Industry, the Sandoz Chemical Works, and J. & R. Geigy, developed the production of certain intermediates and dyes. The developments up to the signing of the armistice in England were not on so extensive a scale as in the United States. England, however, developed a number of vat, alizarin, and similar colors with a good degree of success. The output of the vat colors, however, was not sufficient to supply the total needs of the textile industry of England.

On May 15, 1918, the President of the Board of Trade stated in the House of Commons: "In order to safeguard this particular industry, * * * importation of all foreign dyestuffs shall be controlled by a system of licenses for a period of not less than 10 years after the war." This policy was, in fact, put into effect during February, 1919, by royal proclamation, but came to an end in December, 1919, when a decision was rendered in a test case by Justice Sankey to the effect that there was no adequate legal basis for such control. During the following year large quantities of German and foreign-made dyes were imported. These were so great that the existence of the domestic dye industry was seriously menaced, resulting in the

[7] Report on dyes and dyestuffs prepared by subcommittee appointed by the standing committee on trusts.
[8] Ibid.

sing in December, 1920, of the "Dyestuffs Import Regulations ," under the terms of which importation of synthetic organic s, colors, and coloring matters and of organic intermediates used he manufacture of any such dyes, colors, or coloring matters was hibited except under license. The licensing committee was com- ed of five representatives of the dye consumers, three representa- es of the dye manufacturers, and three neutral members, of whom was chairman. The act also provided for the appointment of a mmittee to advise with the Board of Trade on the efficient and nomical development of the dye-making industry.

LE 29.—*Imports of coal-tar dyes into the United Kingdom, 1913, 1920, and 1921.*

	1913		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
arine and anthracene dye-uffs:						
Germany	6,755,280	$1,319,400	.....	.....	.....	.....
Other foreign countries	55,776	5,480	.....	.....	.....	.....
Total	6,811,056	1,324,880	.....	.....	.....	.....
line and naphthalene:						
Germany	28,966,448	6,727,829	.....	.....	.....	.....
Netherlands	71,008	19,685	.....	.....	.....	.....
Belgium	144,032	39,399	.....	.....	.....	.....
Switzerland	2,479,792	711,881	.....	.....	.....	.....
Other foreign countries	37,744	8,020	.....	.....	.....	.....
Total	31,699,024	7,506,794	.....	.....	.....	.....
thetic indigo:						
Germany	2,675,456	373,168	1,185,072	$627,932	776,272	$401,370
Netherlands	.....	.....	49,504	83,158	2,128	1,156
Belgium	.....	.....	352,016	338,412	19,152	8,031
Switzerland	.....	.....	3,696	3,473	112	135
Other foreign countries	112	68	12,544	22,300	2,464	2,454
Total	2,675,568	373,236	1,602,832	1,075,275	800,128	413,146
er coal-tar dyes:						
Germany	16,464	2,643	7,550,480	10,753,530	2,544,416	2,058,609
Netherlands	.....	.....	2,113,440	3,353,550	41,440	37,522
Belgium	.....	.....	1,080,240	1,116,415	17,248	20,144
Switzerland	.....	.....	6,474,832	7,239,226	1,862,112	2,688,238
United States	.....	.....	1,730,624	1,931,920	67,424	57,429
Other foreign countries	896	131	94,976	57,982	25,536	21,344
Total foreign countries	17,360	2,774	19,044,592	24,452,623	4,558,176	4,889,286
Total British possessions	.....	.....	33,488	39,524	10,192	2,053
Total	.....	.....	19,078 080	24,492,147	4,568,368	4,891,339

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
arine dyes:				
Germany	1,151,584	$1,614,278	1,240,736	$532,956
Netherlands	159,600	360,287	7,056	9,256
United States	19,824	17,081	68,320	79,043
Other foreign countries	13,216	14,465	1,680	4,314
Total foreign countries	1,344,224	2,006,111	.....	.....
Total British possessions	560	1,061	.....	.....
Total	1,344,784	2,007,173	1,317,792	625,569

TABLE 30.—*Total coal-tar dyes—Imports into and exports from the United Kingdom 1920–1922.*

	1920		1921		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Imports:						
Alizarine	1,344,784	$2,007,174	1,317,792	$625,569	1,275,344	$368,407
Indigo synthetic	1,602,832	1,075,274	800,128	413,146	572,768	13,321
Other sorts	19,078,080	24,492,149	4,568,368	4,891,339	4,602,080	5,591,422
Exports	13,791,680	9,385,429	7,621,600	5,033,828		

TABLE 31.—*Exports of coal-tar dyes from the United Kingdom, 1913, 1920, and 1921.*

	1913	
	Pounds.	Value.
Dyestuffs, products of coal tar:		
Russia	68,768	$1,937
Germany	400,288	98,351
Netherlands	132,272	13,038
Belgium	153,328	23,364
France	88,480	28,366
Switzerland	50,288	10,837
Spain	53,424	14,132
Italy	620,032	80,949
Japan [1]	236,880	34,422
United States	1,778,336	286,170
Brazil	59,696	22,439
Other foreign countries	312,368	46,514
Total to foreign countries	3,954,160	667,702
Total to British possessions	1,497,216	194,984
Grand total	5,451,376	862,686

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
Alizarin [2]:				
France	24,752	$9,071	17,808	$8,362
Turkey [3]	19,712	8,570		
United States	40,656	22,629	48,720	27,290
Brazil	60,928	13,799	26,544	5,847
Other foreign countries	37,184	24,367	68,880	31,629
Total foreign countries	183,232	78,436	161,952	73,428
British India	570,080	189,896	1,913,632	622,143
Other British possessions	68,656	25,106	17,808	11,362
Total	821,968	293,438	2,093,392	706,933
Indigo synthetic: [2]				
Netherlands	17,248	14,765	21,168	11,417
Spain	36,400	23,610	56,000	32,797
China	1,112,048	697,470	1,955,744	1,247,420
Other foreign countries	50,400	20,177	9,408	3,170
Total foreign countries	1,216,096	756,022	2,042,320	1,296,803
Egypt	145,712	94,377	22,288	14,433
Canada	112,112	74,646	22,288	9,180
Australia			61,936	28,917
Other British possessions	73,696	41,163	55,216	37,362
Total	1,547,616	966,209	2,204,048	1,387,675

[1] Including Formosa and Japanese leased territories in China.
[2] Alizarin and indigo were included in "Dyestuffs and products of coal tar" prior to 1920.
[3] Exported to ports or places in territory formerly Turkish but now occupied by other powers.

LE 31.—*Exports of coal-tar dyes from the United Kingdom*—Continued.

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
iffs obtained from coal tar:				
	43,456	$18,322	.....	$89
	86,240	113,438	3,808	1,375
	35,168	40,351	5,152	4,807
k	48,608	33,248	10,416	4,738
y	13,552	11,739	9,072	1,132
nds	506,688	322,414	44,352	19,780
	1,420,048	759,275	157,584	81,217
and	606,032	401,670	151,200	53,165
	718,032	249,945	174,384	93,419
	458,416	291,079	17,920	24,121
	398,832	284,646	25,312	22,792
	809,760	506,308	28,896	20,843
	562,576	541,064	103,824	142,609
	307,888	253,048	57,568	94,778
States	348,096	341,896	354,480	390,716
	140,672	165,576	48,832	41,120
reign countries	274,624	183,459	49,056	34,032
oreign countries	6,778,688	4,517,478	1,241,856	1,030,733
	2,411,360	1,930,478	964,544	868,561
a	955,920	1,000,661	540,512	628,512
ritish possessions	1,006,208	474,630	302,064	187,230
	269,920	202,535	275,184	224,652
	11,422,096	8,125,782	3,324,160	2,939,688

e of Hongkong, Macao, and leased territories.
Formosa and Japanese leased territories in China.

BLE 32.—*Imports of coal-tar dyes into Argentina, 1913, 1919, and 1920.*

	1913		1919		1920	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
r:						
y	466,425	$174,728	243	$112	11,254	$4,546
	7,776	3,130	51	23	266,909	103,393
	417	151	18	8	6,850	2,603
	231	101	24	11	64	28
States	996	327	507,748	198,716	328	135
	38,215	15,104	23,128	10,718	702,419	354,565
	10,262	4,407	27,099	11,973	5,192	2,189
Kingdom	3,677	1,383	18,591	8,456	88,572	37,227
and	30,185	10,392	57,611	26,298	6,839	2,726
untries	.....	.....	1,365	486	107,813	46,009
	558,184	209,723	635,877	256,801	1,205,780	461,818
y	2,599	1,677	.....	.....	4	4
	90	59	88	61	64	44
States	.....	.....	24	17	.....	.....
	583	357	262	92	474	243
Kingdom	112	73	208	144	62	36
	3,354	2,166	582	314	604	327

TABLE 33.—*Coal-tar dyes—Imports into and exports from Austria, 1920, 1921.*

	Imports.		Exports.	
	1920	1921	1920	1921
Coal tar or aniline colors:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Germany	1,626,113	3,405,886	5,291	6,504
Switzerland	7,716	18,298	4,850	220
Czechoslavakia	25,794	6,393	109,348	46,267
Hungary	10,582	1,323	65,036	120,502
France			20,723	
Great Britain			33,200	
Italy			88,625	3,527
Turkey			2,425	
Netherlands			3,527	88,494
Poland			8,818	20,723
Yugoslavia			188,934	
Rumania			50,706	23,177
Other countries	6,393	3,732	5,071	6,059
Total	1,676,598	3,437,632	586,644	323,811

TABLE 34.—*Coal-tar dyes—Imports into and exports from Austria-Hungary, 1913.*

	Imports.		Exports.	
	Pounds.	Value.	Pounds.	Value.
Alizarin, alizarin colors, synthetic indigo:				
Bulgaria			1,102	$199
Germany	4,176,835	$1,074,769	1,320,114	230,852
Great Britain	1,102	284	246,695	43,675
Hamburg			882	154
Italy	4,630	1,191	1,102	192
Rumania			5,291	924
Russia in Europe			221	39
Sweden			882	154
Turkey in Europe			1,543	269
British India			1,543	269
Turkey in Asia			1,323	231
Egypt			6,173	1,079
France	1,323	340		
Total	4,183,890	1,076,584	1,586,871	277,906
Azo and sulphur colors:				
Belgium	221	38		
Germany	9,747,859	1,702,051	41,446	7,048
France	17,857	3,118		
Great Britain	24,912	4,350	882	150
Italy	1,984	346		
Netherlands	8,378	1,463		
Russia in Europe	441	77	1,543	262
Switzerland	488,980	85,380	4,409	770
Serbia			882	150
Total	10,290,632	1,796,823	49,162	8,580
All other coal-tar dyes:				
Germany	2,546,533	702,070	425,047	98,935
France	441	121	3,527	820
Great Britain	10,141	2,796	11,905	2,769
Italy	4,630	1,276	39,903	9,278
Netherlands	441	121	2,425	564
Switzerland	129,631	35,739	8,377	1,948
United States	2,425	669	661	154
Belgium			3,748	871
Bulgaria			13,669	3,179
Greece			221	51
Hamburg			7,275	1,691
Montenegro			661	154
Norway			661	154
Rumania			33,289	7,740
Russia in Europe			5,060	1,177
Sweden			1,323	308
Serbia			32,408	7,535
Spain			1,543	359
Turkey in Europe			5,291	1,230
Egypt			2,425	564
British Possessions in Africa			2,646	615
Chile			221	51
Total	2,694,242	742,792	601,635	139,963

TABLE 35.—*Indigo, natural or artificial—Imports into and exports from Belgium, 1913, 1920, and 1921.*

	1913		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Imports:						
Germany	28,171,067	$4,932,428	382,708	$35,120	.....	.....
France	19,090	3,342	213,165	25,673	1,268	$112
Netherlands	589	721	.....	.....	15,433	747
Great Britain	.....	.....	107,655	52,838	13,521	10,964
Switzerland	60,633	12,739	48,964	17,977	.....	.....
Italy	1,252	1,072	34,235	807	1,583	149
Other countries	.....	.....	2	1	.....	.....
Total	28,252,631	4,950,302	786,729	132,416	31,805	11,972
Exports:						
Great Britain	.....	.....	46,641	18,335	32,145	22,559
Argentina	54,654	9,569	.....	.....	.....	.....
Australia	197,682	34,612	.....	.....	.....	.....
China	23,603,821	4,132,756	209,986	33,397	.....	.....
Egypt	200,839	35,165	.....	.....	.....	.....
United States	114,419	20,033	.....	.....	.....	.....
British India	1,078,748	188,876	.....	.....	.....	.....
Japan	.....	.....	5,434	3,156	397	75
Mexico	64,088	11,221	.....	.....	.....	.....
Netherlands	.....	.....	.....	.....	2,132	1,419
Spain	.....	.....	.....	.....	2,994	2,092
Other countries	115,499	20,223	.....	.....	66	78
Total	25,429,750	4,452,455	278,024	64,078	37,734	26,223

TABLE 36.—*Imports of coal-tar dyes into Brazil, 1913, 1920, and 1921.*

	1913		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Aniline or fuchsine dyes:						
Germany	869,787	$517,700	.....	.....	.....	.....
Argentina	26	43	.....	.....	.....	.....
Austria-Hungary	154	101	.....	.....	.....	.....
Belgium	992	630	.....	.....	.....	.....
France	3,503	2,659	.....	.....	.....	.....
Great Britain	35,038	17,942	.....	.....	.....	.....
Italy	55	6	.....	.....	.....	.....
Switzerland	40,860	33,158	.....	.....	.....	.....
Uruguay	13	57	.....	.....	.....	.....
United States	.....	1	.....	.....	.....	.....
Total	950,428	572,297	1,387,017	$2,099,488	1,134,575	$1,010,550
Indigo and ultramarine blue:						
Germany	365,690	37,967	.....	.....	.....	.....
Austria-Hungary	3,968	171	.....	.....	.....	.....
Belgium	46,474	3,792	.....	.....	.....	.....
France	137,646	16,168	.....	.....	.....	.....
Great Britain	228,077	30,571	.....	.....	.....	.....
Other countries	14,912	1,337	.....	.....	.....	.....
Total	796,767	90,006	1,282,153	320,229	501,516	95,036

TABLE 37.—*Imports of coal-tar dyes into Canada, fiscal years ended March 31, 1913, 1920–1922.*

	1913		1920		1921		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Aniline and other coal-tar dyes soluble in water (including alizarin and artificial alizarin):								
United Kingdom	439,673	$77,230	843,567	$497,397	307,686	$221,040	249,063	$131,21
United States	665,560	209,457	2,065,706	2,030,026	1,383,611	1,267,849	1,451,891	915,45
Belgium	600	188						
France	46,267	10,611						
Germany	1,141,792	228,468	2,262	13,223	98,089	480,731	130,190	244,69
Holland	2,665	743						
Switzerland	114,863	28,378	81,501	143,536	117,903	148,418	115,629	205,15
Other countries			21	208	58,698	78,689	317,835	247,59
Total	2,411,420	555,075	2,993,057	2,684,390	1,965,987	2,196,727	2,264,608	1,644,14
Indigo:								
United States	32,013	6,728	332	296	7,915	4,212	339	31
Germany	81,187	16,770						
Total	113,200	23,498	332	296	7,915	4,212	339	31
Indigo paste and extract:								
United Kingdom			79,335	64,883	6,708	3,645		
United States	34,464	3,969	197,563	122,991	45,272	14,590	54,450	11,97
Germany	74,432	11,872	44,800	17,914	200	2,749	11,421	25,90
Other countries							36,027	7,63
Total	108,896	15,841	321,698	205,788	52,180	20,984	101,908	45,51

TABLE 38.—*Imports of coal-tar dyes into China, 1913, 1919–1921.*

SYNTHETIC INDIGO.

From—	1913		1919	
	Pounds.	Value.	Pounds.	Value.
Great Britain	40,000	$6,156	300,800	$178,25
Germany	13,634,796	2,557,003		
Netherlands				
Belgium	24,681,060	3,656,631	4,000	1,62
France	2,358,399	423,393	1,246,400	395,02
Switzerland				
Japan	1,733	266	263,867	213,25
United States			635,467	474,46
All other	1,930,266	394,687	61,867	59,33
Direct gross imports	42,646,256	7,038,137	2,512,399	1,829,82
Reexported abroad	36,267	5,932	6,400	4,67
Total net imports	42,609,989	7,032,205	2,505,999	1,824,65

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
Hongkong	524,000	257,436	1,715,200	680,77
French Indo-China	2,400	1,885	14,400	6,73
Siam	45,600	16,368		
Great Britain	1,476,800	1,147,238	2,643,066	1,476,18
Norway	5,333	5,166		
Germany	2,876,666	3,242,122	2,376,133	1,411,41
Netherlands	1,602,666	1,406,532	2,395,733	1,468,73
Belgium	1,765,866	1,455,312	2,146,799	1,071,27
France	2,917,199	2,292,991	5,165,999	2,487,03
Switzerland	3,334,533	3,460,210	1,522,200	979,97
Italy			66,133	48,95
Austria-Hungary	41,733	36,858		
Korea	533	744		
Japan (including Formosa)	198,267	139,706	35,333	10,93
Canada	42,400	22,117		
United States	5,979,332	5,543,398	3,347,732	1,989,95
Gross Imports	20,813,328	19,028,083	21,427,728	11,903,19
Reexported	61,200	48,055	394,667	237,44
Net imports	20,752,128	18,980,028	21,033,061	11,367,63

BLE 38.—*Imports of coal-tar—China, 1913, 1920–1921*—Continued.

ANILINE.

From—	1913	1919	1920
	$398,084	$321,029	$1,002,843
			408,611
	191,126	51,441	402,482
	1,506,693		1,519,967
	175,829		1,022,234
	1,502,975	50,040	1,039,256
	47,560	439,613	43,579
			482,542
	11,493	1,145,646	1,352,793
		182,328	61,143
	479	2,318,090	2,543,185
	37,723	40,214	21,964
oss imports	3,961,962	4,548,401	9,900,599
road	18,633	318,746	315,038
t imports	3,943,329	4,229,655	9,585,561

UNCLASSIFIED DYES.

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
	9,468,131	$590,512	13,249,863	$503,871
	111,600	4,303	144,133	3,261
hina	1,505,333	30,012	1,312,933	17,083
	45,333	3,329	1,867	426
lts, etc	441,600	22,734	717,066	32,811
			25,867	1,340
	49,333	9,991	113,600	5,584
	134,667	42,920	75,600	16,009
	8,000	3,720	66,667	12,464
		16		21
	131,867	57,886	500,667	99,384
	18,800	9,149	15,333	2,865
	13,867	3,210	67,200	14,146
	185,333	37,233	241,200	50,469
			8,533	2,931
orts	933	140	12,933	2,105
ports	2,800	1,114	272,533	17,557
	1,328,533	25,439	1,848,666	38,625
	4,935,065	854,747	7,688,265	815,295
nds				3
			2,000	869
	292,400	168,277	125,467	58,189
oss imports	18,673,595	1,864,732	26,490,393	1,695,308
	271,867	94,176	584,267	73,618
rts	18,401,728	1,770,556	25,906,126	1,621,690

—*Imports of coal-tar dyes into the Dutch East Indies, 1913, 1920, and 1921.*

	1913		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
ry:						
s	272,985	$85,618	19,489	$16,626	34,337	$31,941
in	3,307	1,037				
	104,785	32,864	20,004	17,066	32,409	30,149
ries					2,756	2,564
	381,077	119,519	39,493	33,692	69,502	64,654
et:						
s	425,311	93,065	270,152	109,962	192,858	78,066
in	2,535	555	1,168	476	59,260	23,987
	530,846	116,157	318,873	129,794	302,650	122,507
			37,037	15,076	39,683	16,063
	958,692	209,777	627,230	255,308	594,451	240,623

TABLE 39.—*Imports of coal-tar dyes into the Dutch East Indies, 1913, 1920, and 1921*—Continued.

	1913		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Synthetic indigo, wet:						
United States			661	$452		
Switzerland			33,069	22,602		
Netherlands		$162,227	302,288	206,610	461,515	$408,672
Germany		264,375	329,870	225,462	514,234	455,579
France		688				
Great Britain			35,256	24,097	25,979	23,016
Singapore					24,471	21,690
Total		427,290	701,144	479,223	1,026,199	909,149
Synthetic indigo, dry:[1]						
Netherlands			21,632	30,340	10,483	12,650
Germany			19,480	27,322	21,934	26,467
Great Britain					13,344	16,102
Other countries					1,001	1,208
Total			41,112	57,662	46,762	56,427
Aniline colors, wet and dry:						
Netherlands	317,989	57,984	271,338	308,916	192,845	64,940
Great Britain	4,418	806	3,869	4,613		
Germany	233,529	42,583	157,093	187,300	216,575	72,931
Belgium	25,124	4,581	29,894	35,643	5,055	1,702
Singapore	141,421	25,787	9,050	10,790	10,702	3,604
Penang	8,768	1,599	35,108	41,699		
Other countries	2,416	440	7,269	8,666	3,962	1,334
Total	733,665	133,780	513,621	597,627	429,139	144,511

[1] 1913 dry indigo included in wet figures.

TABLE 40.—*Coal-tar dyes—Imports into and reexports of dyes from Egypt, 1913, 1921, and 1922.*

	1913		1921		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
IMPORTS.						
Synthetic indigo:						
United Kingdom			75,521	$34,850		
Belgium			27,028	10,768	12,831	$3,938
France			30,412	13,530	11,649	3,234
Germany	1,108,801	$338,048	496,934	385,769	558,749	407,425
Switzerland			56,365	18,308	27,419	9,208
Syria			1,131	603	110	94
United States			4,619	2,402		
Other Countries			56	4	20	67
Total	1,108,801	338,048	692,066	466,234	610,769	424,016
Other coal-tar dyes:						
United Kingdom	161,641	15,889	12,657	13,237	8,635	5,960
Australia and New Zealand			2	4	2	
Belgium	32,474	4,326	2,736	3,248	12,686	2,710
France	11,980	1,488	5,373	3,126	844	634
Germany	333,421	54,296	98,296	76,090	183,469	111,675
Switzerland	16,920	2,393	16,177	19,880	28,007	23,658
Syria			752	1,557	439	632
United States			2,950	5,282	1,658	2,162
Other countries	87,212	11,311	531	936	4,925	2,561
Total	643,648	89,703	139,474	123,360	240,685	152,032
RE-EXPORTS.						
Synthetic indigo			1,105	4,324	359	180
Other coal tar dyes			3,283	12,846	2,666	652

THLY PRODUCTION OF DYES IN GERMANY, FEBRUARY, 1920, TO MARCH, 1923.

ginning with February, 1920, detailed statements of one-quarter ıe monthly production (this portion is required by the peace y [Annex VI, Part II] to be reserved for optional purchases of the l and associated governments) of dyes in Germany were made he Reparations Commission. Copies of these monthly state- s from February, 1920, to March, 1923, inclusive, have been ved by the Department of State, which has given permission for publication by the Tariff Commission. A summary of these ved stocks, showing the monthly reserve for each class of dyes, rding to application, is shown in Table 43.

oduction of dyes in Germany during the first year after the sign- of the armistice was practically negligible compared with the var output, when her exports (in 1913) were nearly 240,000,000 ıds. During February, 1920, the quantity of dyes reserved by ıan plants for the Allies totaled 876,449 pounds, indicating a output of over three and one-half million pounds for that th. A progressive increase is shown for each following month, ıing a maximum reservation of 3,026,247 pounds in August, 1920, sponding to a total output of 12,000,000 pounds monthly. ng the remainder of 1920 the fluctuations with amount re- d varied from a minimum of 2,674,710 pounds in December to a imum of 2,978,806 pounds in November. The total quantity of reserved by the German plants from February to December, , inclusive, was 25,842,201 pounds, corresponding to a produc- of 103,368,804 pounds.

ıe production reserve during 1921 amounted to 29,110,554 ıds, corresponding to a total production of 116,442,216 pounds hat year by the German dye plants. During 1921 the monthly vation for the allied and associated governments varied from inimum of 1,976,094 pounds in February to a maximum of 4,165 pounds in December.

he reservation for 1922 totaled 48,201,641 pounds. This is valent to a total output of 192,806,564 pounds for the year, an ease of 76,364,388 pounds over that of 1921. The month of imum output in 1922 was November, with a total reservation of 6,548 pounds; the minimum output was in April, with a reserva- of 3,317,420 pounds.

he reservation of the first three months of 1923 was 12,298,043 nds, equivalent to a total output of 196,768,688 pounds per year. 1913 the total exports of dyes from Germany were 239,598,133 nds and the annual consumption of that country is variously nated from thirty-three to fifty-five million pounds. Using imum consumption figures, the production of that year approxi- es 295,000,000 pounds; consequently, the 1922 output is about er cent of the pre-war output.

s previously stated, Germany, before the war, dominated the d's markets, producing three-fourths of the total dyes made. r one-half of the dyes made outside of Germany were made from ıary or intermediate products of German origin. Switzerland, h held second place, was entirely dependent upon Germany for

all materials. In England and France the dye factories were to a large extent owned and operated by German dye manufacturers.

Since the outbreak of the war large developments in the manufacture of dyes have been made in the United States, Great Britain, and France, and as a result these countries now produce from 80 to 90 per cent of their consumption, and have, in addition, exported dyes in significant quantities. Italy also has developed a dye industry. Each of these countries has adopted new tariff protective measures. Great Britain has adopted a license system of imports for dyes and fine chemicals. This industrial development has resulted in the loss of a large part of the German dye export trade, and Germany no longer possesses a monopoly of the world's trade in dyes.

The dye industry of that country, however, has the advantage of years of experience, low production costs, and a larger variety of dyes than is made by any other country. In addition, it has a unified organization for both production and merchandizing. The extensive developments since the war have resulted in an approximate doubling of the world's pre-war capacity to manufacture synthetic dyes, and it is highly probable that a period of severe competition will follow and that Germany will make special efforts for reclaiming some of her past trade in the world's markets. China is the largest consumer of dyes, followed by the United States, and it is to be expected that Germany will make particular effort to reclaim a portion of these two important markets. In China and the Far East she has already regained since 1920 a large part of her export trade. The Ruhr occupation in 1923 has hindered to a certain extent Germany's exports of dyes, consequently the other dye-producing nations have obtained a portion of that trade.

TABLE 41.—*One-quarter production in German dye plants*[1] *reserved for purchase of allied and associated governments, February, 1920, to March, 1923.*

[Pounds.]

Group.	Classification of colors.	1920					
		February.	March.	April.	May.	June.	July.
I	Alizarin red	28,629	100,347	79,070	124,401	241,194	206,[illegible]
II	Indigo paste	33,203	124,258	306,371	338,318	291,294	343,[illegible]
III	Vat colors, except Indanthrene blue GCD	15,346	9,361	19,577	62,183	41,786	72,[illegible]
IV	Indanthrene blue GCD	3,135	.....	3,307	9,489	11,329	14,[illegible]
V	Alizarin colors other than red	17,240	22,862	40,622	54,643	92,022	83,[illegible]
VI	Direct colors for cotton	262,123	346,301	400,221	451,138	541,534	694,[illegible]
VII	Direct colors for diazotization	63,402	51,495	54,586	44,687	88,131	126,[illegible]
VIII	Acid colors for wool	149,827	202,819	265,094	360,192	419,842	512,[illegible]
IX	Chrome colors for wool	61,313	91,257	95,605	132,287	182,647	195,[illegible]
X	Basic colors	19,912	44,374	72,289	106,555	124,035	128,[illegible]
XI	Sulphur colors	163,822	149,452	235,423	190,515	305,979	323,[illegible]
XII	Lake colors	56,958	164,229	156,163	130,085	170,742	236,[illegible]
XIII	Intermediate products	1,539	12,599	85,527	89,672	.....	.....
	Total	876,449	1,319,354	1,813,855	2,114,165	2,510,535	3,[illegible]

[1] Peace Treaty, Annex VI, Part II.

One-quarter production in German dye plants reserved for purchase of associated governments, February, 1920, to March, 1923—Continued.

ification of colors.	1920					Total for 11 months, 1920.
	August.	September.	October.	November.	December.	
red	210,328	198,632	215,028	235,775	191,066	1,830,721
paste	777,774	642,729	426,599	635,419	373,803	4,493,515
ors, except Indan-						
e blue GCD	54,828	62,608	84,366	88,440	66,938	578,028
rene blue GCD	9,370	16,043	1,131	3,554	21,867	93,645
colors other than						
	69,612	88,658	58,440	59,698	42,306	609,514
olors for cotton	573,004	593,694	666,239	648,946	600,257	5,778,166
olors for diazotiza-						
	113,973	95,439	117,562	117,653	103,409	977,320
lors for wool	469,589	492,647	487,131	518,041	486,258	4,364,034
colors for wool	200,504	208,760	216,057	163,304	224,272	1,771,252
olors	144,595	163,661	151,145	139,805	164,207	1,257,301
colors	291,832	285,804	262,744	276,510	320,659	2,805,910
lors	110,838	73,565	92,690	91,661	79,668	1,282,795
otal	3,026,247	2,922,240	2,779,132	2,978,806	2,674,710	25,842,201

Classification of colors.	1921		
	January.	February.	March.
red	137,999	35,077	74,103
paste	630,621	529,970	608,849
rs, except Indanthrene blue GCD	50,150	69,754	53,797
rene blue GCD	1,759	2,811	2,917
colors other than red	43,563	12,560	22,090
olors for cotton	512,056	350,355	421,938
olors for diazotization	132,239	52,589	52,128
lors for wool	479,602	358,821	390,547
colors for wool	154,342	98,764	106,751
lors	128,962	159,426	133,423
colors	285,498	207,532	204,609
lors	112,305	98,435	91,936
otal	2,669,096	1,976,094	2,183,088

ification of colors.	1921					
	April.	May.	June.	July.	August.	September.
red	88,063	91,797	124,953	120,744	200,817	166,077
paste	366,405	556,210	474,174	552,056	526,110	411,325
rs, except Indan-						
blue GCD	86,919	110,001	97,483	86,550	95,547	84,802
rene blue GCD	2,370	2,037	9,793	8,415	11,424	4,575
colors other than						
	18,322	16,698	32,491	35,904	25,335	23,325
olors for cotton	423,063	410,545	366,588	379,143	472,106	466,577
olors for diazotiza-						
	63,268	47,668	72,426	48,618	61,705	83,819
ors for wool	430,140	390,589	401,991	365,609	353,545	381,451
colors for wool	131,205	120,986	95,631	100,351	110,658	153,046
lors	155,415	136,478	124,919	101,180	100,968	76,960
colors	252,771	255,745	277,676	331,292	308,794	389,989
lors	76,773	71,431	93,435	63,534	45,543	62,071
tal	2,094,744	2,210,185	2,171,463	2,193,396	2,312,552	2,304,017

Classification of colors.	1921			Total.
	October.	November.	December.	
red	141,773	266,741	281,104	1,729,148
aste	425,475	394,235	671,856	6,147,286
rs, except Indanthrene blue GCD	89,985	74,088	93,473	992,579
rene blue GCD	8,212	4,685	2,205	61,203
colors other than red	16,219	26,524	26,978	300,009
olors for cotton	455,951	643,525	624,433	5,526,280
olors for diazotization	105,589	114,454	128,356	962,859
ors for wool	404,546	538,526	573,456	5,068,823
colors for wool	148,696	207,312	245,473	1,673,215
lors	106,634	133,217	148,028	1,525,610
colors	480,305	534,970	573,853	4,103,034
ors	65,739	114,353	124,950	1,020,508
tal	2,449,124	3,052,630	3,494,165	29,110,55

TABLE 41.—*One-quarter production in German dye plants reserved for purcha allied and associated governments, February, 1920, to March, 1923*—Continued.

Group.	Classification of colors.	1922		
		January.	February.	Ma
I	Alizarin red	332,734	254,168	2
II	Indigo paste	634,808	709,808	9
III	Vat colors, except Indanthrene blue GCD	76,340	109,274	1
IV	Indanthrene blue GCD	2,205		
V	Alizarin colors other than red	33,336	32,388	
VI	Direct colors for cotton	596,269	583,133	7
VII	Direct colors for diazotization	132,655	105,777	1
VIII	Acid colors for wool	601,208	570,828	9
IX	Chrome colors for wool	238,073	232,484	2
X	Basic colors	135,757	144,952	1
XI	Sulphur colors	525,361	573,325	7
XII	Lake colors	133,063	125,005	1
	Total	3,441,809	3,427,142	4,8

Group.	Classification of colors.	1922				
		April.	May.	June.	July.	Au
I	Alizarin red	135,160	139,690	194,397	130,726	1
II	Indigo paste	686,030	823,568	936,772	861,664	1,1
III	Vat colors, except Indanthrene blue GCD	62,754	93,237	69,577	96,367	1
IV	Indanthrene blue GCD	3,115				
V	Alizarin colors other than red	28,693	60,075	53,029	44,308	
VI	Direct colors for cotton	654,984	869,232	805,594	820,821	9
VII	Direct colors for diazotization	106,312	126,577	159,981	99,388	1
VIII	Acid colors for wool	555,680	736,861	679,960	570,835	9
IX	Chrome colors for wool	232,169	339,755	252,700	194,183	2
X	Basic colors	174,734	218,882	191,216	184,904	2
XI	Sulphur colors	543,890	752,456	692,288	710,602	7
XII	Lake colors	133,899	156,449	130,473	131,108	1
	Total	3,317,420	4,316,782	4,165,987	3,844,906	4,5

Group.	Classification of colors.	1922				
		September.	October.	November.	December.	To
I	Alizarin red	200,224	200,511	172,574	75,288	2,2
II	Indigo paste	1,011,931	899,496	1,073,550	754,641	10,3
III	Vat colors, except Indanthrene blue GCD	93,995	88,146	103,290	80,739	1,1
IV	Indanthrene blue GCD			157		
V	Alizarin colors other than red	45,706	43,739	45,862	36,517	4
VI	Direct colors for cotton	854,069	842,340	1,037,796	933,196	9,9
VII	Direct colors for diazotization	127,673	110,955	138,905	90,783	1,4
VIII	Colors for wool	725,181	669,742	717,042	568,073	7,7
IX	Chrome colors for wool	318,077	330,385	240,822	237,241	3,1
X	Basic colors	226,234	230,868	227,711	160,843	2,2
XI	Sulphur colors	671,420	566,366	790,499	764,050	8,0
XII	Lake colors	145,859	162,830	178,341	139,496	1,7
	Total	4,420,369	4,145,578	4,726,549	3,840,800	48,3

Group.	Classification of colors.	1923		
		January.	February.	Ma
I	Alizarin red	316,898	256,600	3
II	Indigo paste	1,448,125	623,329	7
III	Vat colors, except Indanthrene blue GCD	89,359	85,305	
IV	Indanthrene blue GCD		716	
V	Alizarin colors other than red	71,478	54,061	
VI	Direct colors for cotton	982,504	923,380	1
VII	Direct colors for diazotization	93,096	76,643	
VIII	Acid colors for wool	663,860	660,371	
IX	Chrome colors for wool	250,090	186,154	
X	Basic colors	240,753	210,495	
XI	Sulphur colors	730,809	724,751	
XII	Lake colors	144,185	157,768	
	Total	5,031,157	3,965,773	3

TABLE 42.—*Exports of coal-tar dyes from Germany, 1913, 1920–1922.*

	1913		1920		1921 (May to December).	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
alizarin red, variegated colors thracene:						
e-Lorraine			169,754	$89,033	2,205	
e	489,421	$190,560	425,488	234,393	2,205	$817
Britain	5,857,622	976,620	698,858	792,212	17,637	16,340
erlands	416,669	119,100	388,010	247,112	35,274	31,863
ia-Hungary	716,495	119,100	685,631	405,191	156,527	89,870
ia			33,069	21,804	52,910	18,791
oslovakia			130,071	105,386	257,938	94,772
a	725,313	428,760				
en	127,867	47,640	110,230	139,909	33,069	22,059
erland	661,380	95,280	326,281	181,700	121,253	38,399
	50,700	23,820	74,956	170,798	26,455	26,144
h India, etc	5,866,441	905,160	2,627,883	1,592,509	1,990,784	610,299
	205,028	95,280	171,959	292,537	57,320	40,033
Indies, etc	1,298,509	238,200	601,856	505,126	456,352	54,739
d States	5,855,418	1,310,100	438,715	937,572	138,890	103,759
al	24,338,784	5,145,120	7,330,295	6,001,551	3,461,222	1,222,232

	1922	
	Pounds.	Value.
nd alizarin red:		
h India	1,559,100	
n Indies	221,400	
countries	397,000	
al	2,180,500	$1,337,048
olors, variegated, from anthracene:		
Britain	230,200	
	124,600	
oslovakia	190,300	
en	71,200	
erland	100,100	
h India	2,184,500	
countries	1,017,200	
al	3,918,000	$4,465,015

	1913		1920		1921 (May to Dec.)		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
nd other dyes not ally men-								
m	5,531,341	$1,405,380	1,911,388	$1,529,914	405,646	$172,387	314,200	
ria	384,393	71,460	485,012	179,883	174,163	113,563		
e-Lorraine			330,600	243,478	19,841	4,085		
e	3,853,641	1,021,260	1,521,174	1,697,078	6,614	4,085		
Britain	24,285,874	5,259,500	3,514,132	4,764,174	94,798	104,576	1,030,700	
	9,032,246	2,167,620	3,708,137	2,936,272	570,991	249,185	2,951,300	
rlands	3,009,279	666,960	2,555,131	2,918,102	1,940,048	856,216	2,220,900	
ay	595,242	142,920	555,559	528,747	127,857	75,981	353,800	
a-Hungry	12,740,383	2,977,500						
ia			1,942,253	1,166,514	1,765,885	564,547	2,634,500	
slavia			61,729	56,327	92,593	54,739		
oslovakia			6,203,744	3,283,319	6,865,124	2,075,997	6,690,100	
ary			103,616	72,680	330,690	110,295		
Poland			868,612	546,917	11,023	3,268		
gal	921,523	238,200	260,143	230,759	246,915	103,759		
nia	496,035	119,100	229,278	194,419	429,897	271,244		
ark	806,884	142,920	533,513	523,296	141,094	107,844	384,700	
a	2,420,651	833,700						

TABLE 42.—*Exports of coal-tar dyes from Germany, 1913, 1920–1922*—Continued.

	1913		1820		1921 (May to Dec.)		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Aniline and other coal-tar dyes not specifically mentioned—Contd.								
South Russia			72,752	$47,242	379,191	$138,890		
Baltic States			317,462	227,125	1,578,494	589,874	5,078,300	
Finland	520,286	$142,920	522,490	401,557	321,872	126,635	830,300	
Sweden	1,986,345	476,400	2,147,280	2,300,322	498,240	276,146	1,378,300	
Switzerland	1,728,406	500,220	1,144,187	1,142,893	405,646	195,263	1,111,600	
Serbia	211,642	47,640	235,892	94,484	63,933	32,680		
Spain	1,446,218	428,760	1,406,535	1,789,745	537,922	295,754	2,071,900	
Turkey	963,410	214,380	480,603	288,903	116,844	80,883		
British India, etc	8,428,185	1,953,240	1,062,617	1,391,822	1,527,788	778,601	5,750,300	
China	18,653,121	4,549,610	2,458,129	2,620,114	6,305,156	1,366,024	19,673,900	
Japan	7,729,328	2,000,880	1,069,231	1,150,161	3,955,052	1,519,620	8,372,900	
Dutch East Indies	531,309	119,100	365,964	474,237	255,734	103,739	416,700	
Argentina	350,531	119,100	476,194	606,878	279,984	109,478	795,900	
Brazil	1,382,284	404,940	749,564	939,380	542,332	202,616	1,545,000	
Canada	976,638	190,560	2,205	5,407	70,547	52,288		
Chili	123,458	47,640	145,504	238,027	72,752	71,079		
Mexico	1,197,098	285,840	586,424	534,198	502,649	154,413	1,104,500	
United States	30,544,733	6,717,240	886,249	1,677,091	313,053	305,558	453,900	
Other countries							14,221,400	
Total	141,729,325	33,848,220	39,460,135	37,421,115	31,543,417	11,625,093	79,391,000	$61,022,967
Indigo:								
Alsace-Lorraine			2,205	1,817				
France	712,086	309,660						
Great Britain	2,601,428	381,120	1,135,369	655,937				
Italy	1,459,445	238,200	626,106	163,530	97,002	20,425		
Netherlands	1,347,011	214,380	1,097,891	516,028	410,056	71,079	6,179	
Austria-Hungary	3,000,461	476,400						
Austria			251,324	76,314	608,470	102,942		
Czechoslovakia			231,483	107,203	895,068	152,779		
Hungary			2,205	1,817	149,913	29,412		
Russia	956,796	666,960						
Spain	147,708	119,100	279,984	408,825	101,412	39,276		
Egypt	976,638	214,380	332,895	254,380	201,007	192,812		
British India, etc	714,290	309,660	273,370	241,661	207,232	152,779		
China	47,090,266	6,407,580	7,927,742	5,431,013	8,439,209	1,343,148	23,614,400	
Japan	1,809,977	1,357,740	520,286	719,532	1,067,026	665,038	1,204,400	
East Indies, etc.	2,103,188	357,300	844,362	570,538	588,628	138,890		
United States	7,630,121	1,000,440	6,614	7,268	6,614	3,268		
Dutch Indies							1,068,600	
Other countries							3,980,200	
Total	73,530,024	12,696,060	14,349,741	9,579,741	13,300,352	3,088,260	30,485,400	13,946,982

	1922	
	Pounds.	Value.
Indigo carmine and color lakes of indigo:		
Italy	18,700	
Czechoslovakia	142,200	
Egypt	88,600	
Other countries	169,300	
Total	418,900	$381,774

TABLE 43.—*Imports of coal-tar dyes into Germany, 1913, 1920–1922.*

	1913		1920		May to December, 1921.		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alizarin, alizarin red, variegated, from anthracene:								
Great Britain	74,956	$10,234	.....	.....	.....	.....	.....	.....
Austria-Hungary	1,227,962	165,648	.....	.....	.....	.....	.....	.....
Total	1,328,933	179,452	2,205	$1,817	2,205	$817	9,700	$6,679
Indigo, natural and artificial:								
British East Indies	51,357	38,794	.....	.....	.....	.....	.....	.....
China	5,732	2,856	.....	.....	.....	.....	.....	.....
Dutch East Indies	13,448	12,376	.....	.....	.....	.....	.....	.....
Salvador	22,928	12,376	.....	.....	.....	.....	.....	.....
Total	128,308	92,582	.....	.....	2,205	.....	21,800	2,290
Aniline and other coal-tar dyes not specified:								
Belgium	239,199	59,500	.....	.....	.....	.....	.....	.....
France	179,454	44,506	.....	.....	.....	.....	.....	.....
Great Britain	491,405	122,094	.....	.....	.....	.....	.....	.....
Netherlands	434,968	108,052	.....	.....	.....	.....	137,100	.....
Austria-Hungary	434,306	107,814	.....	.....	.....	.....	.....	.....
Switzerland	3,802,935	944,384	.....	.....	.....	.....	.....	.....
United States	.....	.....	.....	.....	.....	.....	730,800	.....
Other countries	.....	.....	.....	.....	.....	.....	133,700	.....
Total	5,680,372	1,410,388	44,092	16,353	287,047	32,680	1,001,800	102,937

GERMANY.

NOTE.—Conversion of the mark made at following values:

1913	$0.2382	1921	$0.00817
1920	.01817	1922	.00233

TABLE 44.—*Imports of coal-tar dyes into British India, fiscal years ended March 31, 1914, 1920-1922.*

	1914.		1920.		1921.		1922.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alizarin dyes:								
United Kingdom	963,698	$114,660	1,932,372	$876,749	825,964	$457,165	1,862,589	$1,034,577
Other British possessions	54	19	.....	.....	.....	.....	.....	.....
Germany	4,637,450	631,497	89,600	31,080	2,061,993	1,520,061	2,861,467	1,364,650
Holland	64,294	8,847	.....	.....	572,662	453,823	427,779	289,535
Belgium	804,243	160,332	.....	.....	262,166	188,955	252,031	119,717
Switzerland	.....	.....	.....	.....	20,908	15,567	57,452	24,812
France	.....	.....	.....	.....	4,442	3,685	.....	.....
Italy	.....	.....	.....	.....	5,952	3,983	.....	.....
Austria-Hungary	.....	.....	.....	.....	74,174	37,971	.....	.....
United States	.....	.....	5,608	5,703	54,469	44,883	.....	.....
Other countries	.....	.....	.....	.....	.....	.....	261,760	129,532
Total	6,469,739	915,355	2,027,580	913,532	3,882,730	2,726,093	5,723,078	2,962,322
Synthetic indigo:								
United Kingdom and other British possessions	3,248	657	2,240	1,250	137,200	113,764	224	298
Switzerland	.....	.....	9,072	5,558	66,528	125,576	.....	.....
Germany	602,336	268,675	.....	.....	.....	.....	112,784	183,208
Holland	1,680	808	.....	.....	.....	.....	.....	.....
Belgium	68,096	30,552	.....	.....	.....	.....	.....	.....
United States	.....	.....	2,912	2,992	6,720	7,772	112	119
Other countries	2,352	1,032	.....	.....	1,456	3,034	3,584	6,426
Total	677,712	301,724	14,224	9,800	211,904	250,146	116,704	190,051

TABLE 44.—*Imports of coal-tar dyes into British India, fiscal years ended March 31, 1914, 1920–1922*—Continued.

	1914		1920		1921		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Aniline dyes:								
United Kingdom and other British possessions	102,869	$37,409	1,619,795	$1,336,140	2,642,407	$3,043,911	1,093,865	$2,069,741
Germany	7,553,830	1,987,002	830	2,057	1,591,108	2,833,802	2,988,691	4,127,612
Holland	26,077	5,815	.....	.....	43,360	118,704	85,341	160,178
Belgium	916,422	223,163	40,977	62,777	129,553	305,847	120,133	163,166
France	672	195	1,914	4,312	14,773	30,340	.....	.....
Switzerland	822,507	174,041	516,073	1,139,615	296,855	545,049	639,325	849,435
Italy	252,232	55,921	120	108	53,692	118,179	183,666	198,553
Austria-Hungary	27,666	6,983	.....	.....	200	372	.....	.....
Japan	147	73	5,400	12,577	6,726	18,157	.....	.....
United States	200	49	1,912,140	2,255,776	1,958,682	2,778,671	723,173	1,028,871
Other countries	500	131	721	[1] 2,053	866	[1] 439	34,855	46,813
Total	9,703,122	2,490,782	4,097,970	4,815,415	6,738,222	9,793,471	5,870,049	8,637,905
Other dyes obtained from coal tar:								
United Kingdom	1,232	560	.....	.....	8,249	4,894	3,956	3,331
Germany	30,436	13,373	.....	.....	.....	.....	4,955	2,373
Belgium	41,366	19,237	.....	.....	80	505	.....	.....
Holland	.....	.....	.....	.....	924	4,482	.....	.....
Other countries	.....	.....	.....	.....	82	48	12,495	2,256
Total	73,034	33,170	.....	.....	9,335	9,931	21,406	7,984

[1] Duty was collected on £1,162,599 in 1919-20, and £2,630,138 in 1920-21.

CONVERSION NOTE.—Value is stated in "Annual Statement of Sea-borne Trade of India" in pounds sterling converted from rupees at rates of 15 rupees to 1 pound sterling in 1913, and 10 rupees to 1 pound sterling in 1920, 1921, and 1922 (fiscal years ending Mar. 31). Conversion to dollars made at rates of $4.8665 to 1 pound sterling in 1913, $4.1385 to 1 pound sterling in 1920, $3.7223 to 1 pound sterling in 1921, and $3.9719 to 1 pound sterling in 1922, the last two being averages for respective 12 months ending Mar. 31, based on Federal Reserve Board daily rates. Violent fluctuations in the dollar value of the rupee make conversions of no practical significance.

TABLE 45.—*Exports of indigo from British India, 1920–1922.*

Exported to—	1920		1921		1922	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
United Kingdom	137,088	$250,586	126,448	$217,900	72,464	$120,262
Egypt	627,200	946,686	153,552	177,010	218,064	283,661
France	1,344	3,253	.....	.....	1,680	1,962
Italy	.....	.....	2,128	2,349	4,592	5,473
Greece	1,120	3,439	5,600	12,526	30,240	67,375
Persia	68,432	118,171	85,456	123,513	158,816	248,789
China	25,312	567,706	20,272	39,899	4,928	7,733
Japan	2,389,856	3,314,032	652,960	782,182	801,360	1,122,797
United States	9,296	20,639	3,136	6,049	.....	.....
Other countries	401,296	780,769	98,448	172,651	92,400	172,696
Total	3,660,944	5,494,281	1,148,000	1,534,079	1,384,544	2,046,309

TABLE 46.—*Imports of coal-tar dyes into Japan, 1913, 1919–1921.*

Imported from—	1913 [1]		1919		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Great Britain	178,674	$36,624	123,615	$274,672	252,247	$384,801	93,721	$144,211
France			61,990	116,760	182,951	345,016	88,154	116,968
Germany	8,600,252	1,854,528	47,781	110,265	779,980	1,327,186	3,990,232	4,636,871
Switzerland	663,977	146,723	454,368	769,787	129,091	273,499	173,991	234,561
United States			2,070,173	4,140,875	2,973,361	5,153,858	872,845	874,087
Other countries	312,357	62,380	16,903	51,022	134,237	278,854	368,938	481,983
Total	9,755,260	2,100,255	2,774,830	5,463,381	4,451,867	7,763,214	5,587,881	6,488,681

[1] Aniline dyes.

TABLE 47.—*Imports of coal-tar dyes into Italy, 1913, 1920, and 1921.*

	1913		1920		1921 (first 6 months).	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Indigo, synthetic:						
France			57,540			
Germany	1,248,465	$273,240	451,502		6,173	
Great Britain and Ireland	1,102	241				
Switzerland	98,546	21,568	110,009		3,086	
Austria-Hungary	882	193				
Other countries			10,141			
Total	1,348,995	295,242	629,192	$139,862	9,259	$2,991
Germany (reparations)			566,582		1,006,841	
Total			1,195,774		1,016,100	
Colors derived from tar or other bituminous substances:						
In dry state—						
Austria-Hungary	72,090	18,302				
Belgium	80,688	20,485				
France	59,745	15,168				
Germany	10 403,948	2,641,336	4,185,212		2,063,064	
Great Britain and Ireland	612,879	155,597	910,500		84,657	
Holland	17,637	4,478				
Switzerland	1,221,348	310,074	1,789,694		516,097	
United States			704,810		111,112	
Other countries			289,684		37,478	
Total	12,468,335	3,165,440	7,879,900	5,307,836	2,812,408	1,751,280
Germany (reparations)			772,933		2,376,118	
Total			8,652,853		5,188,526	
In paste or liquid—						
France						
Germany	1,440,706	126,126	313,494		38,360	
Switzerland	284,393	24,897				
Other countries			49,824		3,086	
Total	1,725,099	151,023	363,318	163,152	41,446	8,630
Germany (reparations)			48,501		113,316	
Total			411,819		154,762	

TABLE 48.—*Exports of coal-tar dyes from Italy, 1913, 1920, and 1921.*

	1913		1920		January to June, 1921.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Synthetic indigo:	*Pounds.*		*Pounds.*		*Pounds.*	
Austria-Hungary	7,275	$1,592				
Germany	220	48				
Greece	220	48				
Egypt	220	48				
Total	7,935	1,736			11,023	$3,134
Colors derived from tar and other bituminous substances:						
In dry state—						
Austria-Hungary	441	112				
Canada	220	56				
France	1,102	280	134,041		27,337	
Belgium			113,317		7,275	
Germany	34,613	8,787				
Great Britain	9,480	2,407				
Greece	1,323	336				
Netherlands	4,630	1,175				
Spain			61,950		33,526	
Switzerland	5,071	1,287				
Turkey in Europe	1,323	336				
Turkey in Asia	220	56				
African Portuguese	441	112				
Egypt	441	112				
Argentina	1,102	280				
Brazil	441	112				
Chile	661	168				
Peru	220	56				
United States	2,645	672				
Uruguay	441	112				
Tripoli	1,543	392				
Other countries	441	112	102,956		200,400	
Total	66,799	16,960	412,264	$277,695	266,538	165,973
In paste or liquid—						
Austria-Hungary	5,071	444				
France	1,984	173				
Belgium	6,173	540				
Germany	7,055	618				
Great Britain	6,173	540				
Turkey in Europe	1,764	154				
Turkey in Asia	220	19				
Argentina	1,764	154				
Tripoli	5,512	483				
Eritrea	2,866	251				
Other countries	4,409	386				
Total	42,991	3,762	358,030	80,388	104,940	13,913

TABLE 49.—*Synthetic organic colors—Imports into and exports from Italy, July-December, 1921.*

Colors.	Imports.		Exports.	
	Pounds.	Value.	Pounds.	Value.
Sulphur	69,004	$38,578	29,542	$12,463
Other:				
Dry	895,509	658,020	51,350	30,858
Paste	126,764	97,158	114,419	27,397

TABLE 50.—*Imports of coal-tar dyes into Mexico, 1919–1921.*

	Fiscal year 1919.		April, 1920.		April, 1921.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Aniline, alizarine (natural and artificial), and anthracene colors:						
United States	153,764	$47,758	19,901	$7,874	8,408	$2,725
Germany			2,394	1,029	165	74
Great Britain					16,727	1,982
	153,764	47,758	22,295	8,903	25,300	4,779

TABLE 51.—*Imports of coal-tar dyes into the Netherlands, 1920 and 1921.*

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
Aniline and other coal-tar dyes:				
Germany	3,190,101	$3,513,158	1,879,959	$1,569,456
Belgium	26,391	12,143	27,857	16,572
Great Britain	361,734	227,503	52,827	32,798
France	14,012	4,382	75,893	37,191
United States	186,260	73,817	16,462	7,118
Sweden	1,554	4,327	.....	.....
Denmark	15,785	24,083	.....	.....
Switzerland	240,249	301,890	157,790	119,773
Austria	.....	.....	12,588	4,983
Total	4,036,086	4,161,303	2,223,376	1,787,891
Synthetic indigo:				
Great Britain	.....	.....	21,182	7,132
Germany	1,137,867	491,655	421,515	141,924
Belgium	5,126	8,449	.....	.....
Switzerland	60,276	24,465	.....	.....
Finland	3,365	5,985	.....	.....
Total	1,207,591	530,994	443,142	149,206

TABLE 52.—*Exports of coal-tar dyes from the Netherlands, 1920 and 1921.*

	1920		1921	
	Pounds.	Value.	Pounds.	Value.
Aniline and other coal-tar dyes:				
Germany	24,220	$18,644	68,049	$30,546
Belgium	22,178	16,250	17,630	9,541
Great Britain	108,502	153,719	38,362	31,734
France	40,179	58,159	6,499	7,108
United States	21,923	26,740	19,270	17,739
East Indies	53,731	48,640	11,226	11,577
Norway	3,258	2,806	.....	.....
Denmark	6,490	3,039	.....	.....
Greece	4,200	4,500	.....	.....
Italy	12,086	5,948	7,231	1,704
Portugal	1,739	1,780	.....	.....
Spain	4,614	2,658	5,097	6,323
Japan and Korea	4,533	5,803	5,935	6,779
British India	1,054	6,219	5,033	1,700
Siam	13,924	6,832	.....	.....
Argentina	5,694	7,542	2,182	2,387
Brazil	5,747	7,326	450	1,869
Cuba	1,497	2,106	.....	.....
Mexico	9,925	11,664	.....	.....
Bulgaria	.....	.....	5,509	2,931
Rumania	.....	.....	3,170	1,945
Serbia	.....	.....	8,175	6,300
Total	351,248	396,053	220,092	149,696
Synthetic indigo:				
Great Britain	20,425	9,172	3,935	$ 4,162
China	15,130	3,506	.....	.....
Switzerland	.....	.....	8,056	8,609
Total	35,556	12,678	12,213	13,011

TABLE 53.—*Imports of coal-tar dyes into Russia, 1913.*

	Pounds.	Value.		Pounds.	Value.
Indigo extract in paste or liquid (indigo carmine) Germany	1,300	$787	Indigo (except extract and indigotine):		
Alizarin, alizarin cake, and other synthetic organic dyes, their bases and combinations:			Austria-Hungary	23,871	$17,[illegible]
Austria-Hungary	15,131	11,699	United Kingdom	16,756	11,[illegible]
Great Britain	20,404	15,780	Germany	1,019,067	726,[illegible]
Germany	3,238,451	2,553,208	Netherlands	113,611	83,[illegible]
Netherlands	3,756	2,765	Italy	1,733	1,[illegible]
China and Mongolia	361	241	China	396	[illegible]
Norway	36	3	East Indies	205,265	148,[illegible]
Turkey	253	125	Persia	469	[illegible]
France	30,407	5,466	Turkey	108	[illegible]
Switzerland	87,176	85,415	France	29,685	21,[illegible]
Japan	108	50	Switzerland	11,051	7,[illegible]
Other countries	181	142	Sweden	2,203	1,[illegible]
			Other countries	12,314	8,[illegible]
Total	3,396,264	2,674,894	Total	1,436,169	1,024,[illegible]
Indigotine (indigo extract) (dried):					
Germany	1,806	1,378			
Other countries	108	109			
Total	1,914	1,487			

TABLE 54.—*Imports of coal-tar dyes into Spain, 1914, 1920, and 1921.*

	1914		1920		1921	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Colors derived from coal and other artificial colors, in powder or crystal:						
Germany	1,026,823	$485,419				
Austria-Hungary	163	77				
Belgium	15,889	7,511	39,341		27,708	
Chile	249,627	118,008				
United States	79	37	712,996		67,425	
France	51,504	24,348	40,064		115,885	
Great Britain	588,145	278,039	577,334		22,141	
Holland	1,702	805				
Italy	34,438	16,280	121,945		156,028	
Portugal	882	417				
Switzerland	48,109	22,743	362,249		93,391	
Other countries			1,061,385		1,179,111	
Total	2,017,361	953,684	2,915,314	$1,210,373	1,664,689	$539,[illegible]
Thio carbon:						
Germany	563,639	61,679				
Belgium	4,431	485				
France	7,454	816				
Great Britain	28,761	3,147	52,166		99	[illegible]
Italy	4,676	512				
Switzerland	65,854	7,206	1,323			
United States			12,478			
Other countries			25,937			
Total	674,815	73,845	92,904	8,929	99	[illegible]
Colors derived from coal in paste or liquid:						
Germany	66,881	15,809	175,530		18,779	
Cuba	187,475	44,313				
Denmark	207	49				
France	14,881	3,517	8,706		20,628	
Great Britain	4,277	1,011	3,763		324	
Holland	1,779	421				
Italy	1,900	449				
Switzerland	8,948	2,115	20,587		3,327	
Other countries			54,465		5,157	
Total	286,348	67,684	263,051	54,606	48,215	7,[illegible]

TABLE 55.—*Exports of coal-tar dyes from Sweden, 1913, 1920, and 1921.*

	1913		1920		1921 (preliminary).	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Aniline and other tar colors, n. s. p. f.:						
Norway			4,899	$9,907		
Denmark			14,063	24,229		
Finland			46,155	87,855		
Great Britain			3,768	8,272		
Other countries			2,233	4,367		
Total	7,315	$2,223	71,118	134,630	64,921	$60,811
Alizarin colors			192	583	82	272
Indigo (synthetic)			5,456	2,999		

TABLE 56.—*Imports of coal-tar dyes into Sweden, 1913, 1920, and 1921.*

	1913		1920		1921 (preliminary).[1]	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alizarin colors:						
United States			3,774	$4,150		
Germany	128,938	$45,455	88,098	96,865		
Other countries	7,656	2,699	1,305	1,435		
Total	136,594	48,154	93,177	102,450	42,531	$34,710
Aniline and other tar colors:						
United States			67,703	62,034		
Norway			22,846	20,933		
Denmark	20,740	6,303	59,081	54,133		
Germany	1,873,500	569,375	2,171,042	1,989,251		
Netherlands	50,115	15,230	22,057	20,210		
Great Britain			93,155	85,355		
Belgium	12,983	3,947				
Switzerland	87,095	26,469	456,976	418,711		
Other countries	5,084	1,545	3,918	3,589		
Total	2,049,517	622,869	2,896,778	2,654,216	914,475	653,024
Indigo (synthetic):						
Germany	110,104	18,739	76,105	72,015		
Switzerland			55	56		
Others	5,272	897				
Total	115,376	19,636	76,160	72,071	23,713	14,133
Other indigo colors, Germany	74,679	9,078	25,648	4,699	3,309	675

[1] Not given by countries.

TABLE 57.—*Coal-tar dyes—Imports into and exports from Turkey, fiscal year March, 1913–March, 1914.*

	Imports.		Exports.	
	Pounds.	Value.	Pounds.	Value.
Colors of aniline and alizarine:				
England	38,146	$4,857		
Germany	709,694	161,041		
Austria-Hungary	195,912	44,229	2,405	[illegible]
Italy	1,819	449		
Sweden	463	89		
Switzerland	19,930	3,438		
United States	115	20	18	[illegible]
Belgium	76,266	12,857		
Bulgaria			2,560	[illegible]
Russia	1,653	526	238	[illegible]
Rumania			1,587	[illegible]
Holland	22,848	4,829	2,813	[illegible]
France	17,322	3,532	11	[illegible]
Greece	4,098	1,057	31	[illegible]
India	7,751	1,705		
Egypt	3,181	496	14,328	[illegible]
Other countries	6,510	1,237	1,060	[illegible]
Total	1,105,708	240,352	25,051	[illegible]
Indigo:				
England	424,703	63,790		
Germany	240,420	103,930		
Austria-Hungary	179,693	21,907		
Italy	31	5		
Persia	22	13	611	[illegible]
Switzerland	110	6		
Belgium	142,907	12,017		
Bulgaria			35	[illegible]
Holland	7,685	1,427		
France	227,689	15,557		
Greece	44	18	198	[illegible]
India	291,126	176,902		
Egypt	11,380	5,260	699	[illegible]
Other countries	86	42	392	[illegible]
Indeterminate	99	5		
Total [1]	1,525,995	401,019	1,936	[illegible]
Corrected total	1,525,995	400,969	1,935	[illegible]

[1] Officially published total incorrect.

PART VI.

APPENDIX.

STATISTICS OF DOMESTIC IMPORTS AND EXPORTS.

STATISTICS OF IMPORTS AND EXPORTS.

58.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1922.*

[Act of Sept. 8, 1916.]

GROUP I, CRUDE (FREE).

	Years.			
	1917		1918	
	Quantity.	Value.	Quantity.	Value.
bolic, which on being subjected to distillation the portion distilling below 200° C. a quantity of less than 5 per cent of original distillate..pounds..	151,254	$9,894	155,236	$17,260
e oil.....gallons..	61,200	3,105	.....	.....
.....pounds..	3,598,733	341,700	2,673,855	87,570
.....do....	7,665,442	532,529	8,873,271	779,045
eosote oil.....gallons..	9,817,085	786,638	1,545,247	162,869
ne having a solidifying point less than 79° C. .....pounds..	5,206,980	175,554	3,902,731	130,098
nd quinoline.....do....	12,247	1,480	9,237	1,036
rude.....barrels..	6,780	10,745	13,087	21,200
tar.....do....	5,926	12,039	14,029	29,095
, orthocresol, and paracresol—purity less than 90 .....pounds..	20,708	1,404	.....	.....
.....do....	9,332	2,928	.....	.....
products found naturally in coal tar whether pro- obtained from coal tar or other sources, n. s. p. f. .....pounds..	.....	10,448	.....	2,756
istillates, which on being subjected to distillation the portion distilling below 200° C. a quantity of less than 5 per cent of the original distillate .....pounds..	.....	1,502	.....	10,473
e, purity less than 25 per cent.....do....	(1)	(1)	18	5
ene, cumol fluorene, methylanthracene, and aphthalene.....pounds..	(1)	(1)	.....	.....
purity less than 25 per cent.....do....	(1)	(1)	.....	.....

	Years.			
	1919		1920	
	Quantity.	Value.	Quantity.	Value.
bolic, which on being subjected to distillation the portion distilling below 200° C. a quantity of less than 5 per cent of original distillate..pounds..	1,965,289	$187,788	192,692	$19,848
e oil.....gallons..	18,699	3,994	15,054	3,945
.....pounds..	217,805	5,617	486,619	10,868
.....do....	6,435,650	557,214	10,318,070	901,381
eosote oil.....gallons..	11,268,379	1,374,217	18,427,152	3,796,399
ne having a solidifying point less than 79° C. .....pounds..	3,239,256	92,265	15,012,096	530,219
nd quinoline.....do....	165,064	20,543	863,456	168,800
rude.....barrels..	22,339	38,476	11,901	24,140
tar.....do....	3,364	8,598	8,780	26,022
, orthocresol, and paracresol—purity less than 90 .....pounds..	11,200	1,221	.....	.....
.....do....	1,195,706	30,768	.....	.....
products found naturally in coal tar whether pro- obtained from coal tar or other sources, n. s. p. f. .....pounds..	380,525	6,334	240,096	14,046
istillates, which on being subjected to distillation the portion distilling below 200° C. a quantity of less than 5 per cent of the original distillate .....pounds..	104,568	10,548	.....	.....
e, purity less than 25 per cent.....pounds..	82,669	2,022	202,569	16,590
ene, cumol fluorene, methylanthracene, and aphthalene.....pounds..	15,759	946	.....	.....
purity less than 25 per cent.....pounds..	112	82	.....	.....

s not available by calendar year.

TABLE 58.—*Imports of coal-tar products entered for consumption, calendar years, 1917 to 1922*—Continued.

GROUP I, CRUDE (FREE)—Continued.

	Years.			
	1921		1922	
	Quantity.	Value.	Quantity.	Value.
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate...pounds..	214,185	$22,849	311,914	$23,7[illegible]
Anthracene oil.....gallons..	12,776	5,019	13,368	3,[illegible]
Benzol.....pounds..	1,722,085	442,370	172,528	1,[illegible]
Cresol.....do....	3,353,882	253,886	3,756,651	284,[illegible]
Dead or creosote oil.....gallons..	33,239,432	4,756,618	41,566,767	4,220,[illegible]
Naphthalene having a solidifying point less than 79° C. .....pounds..	4,495,806	135,943	3,144,332	94,[illegible]
Pyridine and quinoline.....do....	72,515	11,367	119,973	21,[illegible]
Coal tar, crude.....barrels..	21,551	46,784	23,431	54,[illegible]
Pitch, coal tar.....do....	417	1,264	1,422	4,[illegible]
Metacresol, orthocresol, and paracresol—purity less than 90 per cent.....pounds..	.....	.....	3,962	[illegible]
Toluol.....do....	.....	.....	144,237	8,[illegible]
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f. .....pounds..	40,707	3,111	424,530	3,[illegible]
All other distillates, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate .....pounds..	7,310	959	450,727	38,[illegible]
Anthracene, purity less than 25 per cent.....pounds..	58,111	1,198	33,600	[illegible]
Acenaphthene, cumol fluorene, methylanthracene and methylnaphthalene.....pounds..	100	64	66	[illegible]
Carbazol, purity less than 25 per cent.....pounds..	.....	.....	.....	.....

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922).

Article and year.	Pounds.	Value.	Duty.	Actual and computed ad valorem rate.
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.:				
Acids—				
Amidosalicylic—				
1917	.....	.....	.....	.....
1918	.....	.....	.....	.....
1919	.....	.....	.....	.....
1920	11,199	$8,182	$1,507	[illegible]
1921	.....	.....	.....	.....
1922	.....	.....	.....	.....
Benzoic—				
1917	4,653	20,539	3,190	[illegible]
1918	1,791	14,060	2,154	[illegible]
1919	63	374	58	[illegible]
1920	250	1,087	169	[illegible]
1921	11,263	3,012	733	[illegible]
1922 [a]	100	365	.....	.....
Carbolic (phenol) which on being subjected to distillation yields in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate—				
Crystal—				
1917	30,676	4,954	1,510	[illegible]
1918	148,261	47,085	10,769	[illegible]
1919	.....	.....	.....	.....
1920	.....	.....	.....	.....
1921	250	142	28	[illegible]
1922 [a]	280,224	30,414	.....	.....
1922 [b]	69,310	16,102	.....	.....
Liquid—				
1917	314,585	24,246	11,502	[illegible]
1918	134,406	15,186	5,638	[illegible]
1919	2,061	264	91	[illegible]
1920	1,040	244	63	[illegible]
1921	.....	.....	.....	.....
1922 [a]	1,702	1,801	.....	.....
1922 [b]	145,375	18,488	.....	.....
Salicylic—				
1917	26,273	23,575	4,193	[illegible]
1918	117	112	20	[illegible]

* First nine months. [a] Act of 1916. [b] Act of 1922.

TABLE 58.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1922*—Continued.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Contd.

Article and year.	Pounds.	Value.	Duty.	Actual and computed ad valorem rate.
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.—Con.				
Acids—Continued.				
1919				
1920				
1921				
1922 [a]	2,276	$1,881		
Amidonaphthol—				
1917				
1918				
1919	150	72	$15	20.21
1920				
1921	11,025	9,990	1,774	17.76
1922				
Amidophenol—				
1917				
1918				
1919	1,028	2,417	388	16.06
1920				
1921	14,623	11,699	2,120	18.12
1922				
Aniline oil—				
1917				
1918				
1919				
1920	220	72	16	22.64
1921	11,243	1,799	551	30.62
1922 [a]				
1922 [b] [c]	55	11		
Aniline salt—				
1917				
1918	21,273	3,250	1,019	31.36
1919				
1920	4	1	.25	25.00
1921	18,316	12,109	2,274	18.78
1922 (included in aniline oil)				
Anthracene, purity of 25 per cent or more—				
1917				
1918				
1919	51,895	8,011	2,499	31.19
1920	648,095	87,413	29,314	33.54
1921	261,645	12,639	8,437	66.75
1922 [b]	2	2		
Anthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
1921	127,427	78,255	14,924	19.07
1922				
Benzaldehyde—				
1917				
1918				
1919	24,472	17,790	3,280	18.44
1920	9,479	5,928	1,126	19.00
1921	1,056	465	96	20.68
1922 [b]	20	11		
Benzychloride—				
1917	5	7	1	16.86
1918				
1919	1,000	430	90	20.81
1920	150	22	7	32.05
1921				
1922 [a]				
1922 [b]	29		10	
Binitrotoluol—				
1917	61,632	10,471	3,111	29.71
1918	22,635	3,333	1,066	31.98
1919	6,896	1,331	372	27.95
1920	4,692	1,216	300	24.64
1921	1,164	155	52	33.77
1922				

[a] Act of 1916. [b] Act of 1922. [c] Includes aniline salts.

TABLE 58.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1922*—Continued.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Concl.

Article and year.	Pounds.	Value.	Duty.	Actual and computed ad valorem rate.
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.—Con.				
Binitrobenzol—				
1921	5	$3	$0.58	19.33
1922				
Carbazol, purity of 25 per cent or more—				
1917				
1918				
1919				
1920	157	27	8	29.59
1921				
1922 a	8,820	3,865		
1922 b				
Dimethylaniline—				
1917				
1918				
1919	1,120	427	92	21.54
1920	22,400	15,968	2,955	18.51
1921				
1922 a	23,565	3,828		
1922 b				
Metacresol, orthocresol, and paracresol, purity of 90 per cent or more—				
1917				
1918				
1919				
1920	2,444	2,230	396	17.74
1921	556	341	65	19.06
1922 a	2,224	107		
1922 b	1,008	167		
Methylanthrsquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
1921				
1922				
Napthalene solidifying at 79° C. or above—				
1917	267,057	12,125	8,497	70.09
1918	2,795	171	96	55.97
1919	7,650	384	249	64.85
1920	3,697,562	416,172	154,865	37.21
1921	441,685	31,458	15,761	50.10
1922 a	75,680	7,684		
1922 b				
Naphthol—				
1917	1,027	1,069	186	17.40
1918				
1919				
1920				
1921	333,356	112,922	25,272	22.38
1922 a	658	799		
1922 b				
Naphthylamine—				
1917				
1918	11,761	5,985	1,192	19.91
1919				
1920	69,695	7,208	2,624	36.40
1921				
1922				
Nitrobenzol—				
1917				
1918				
1919	21,513	4,003	1,138	28.44
1920	45,891	6,009	2,049	34.09
1921				
1922				
Nitronaphthalene—				
1917	18,102	7,758	1,819	23.45
1918				
1919				
1920				
1921				
1922				
Nitrophenylenediamine—				
1921	1,132	6,590	1,017	15.43
1922				

a Act of 1916. b Act of 1922.

TABLE 58.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1922*—Continued.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued.

Article and year.	Pounds.	Value.	Duty.	Actual and computed ad valorem rate.
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.—Con.				
Nitrotoluol—				
1917				
1918				
1919	542	$452	$81	18.00
1920	684	359	71	19.76
1921				
1922				
Phenylenediamine—				
1917				
1918				
1919	2,746	1,769	334	18.88
1920	2,429	1,887	344	18.22
1921				
1922 [a]	6	16		
1922 [b]				
Phthalic anhydride—				
1917	98	1,853	280	15.13
1918				
1919				
1920				
1921				
1922 [a]	3,374	2,517		
1922 [b]				
Resorcin—				
1917	134	672	104	15.50
1918				
1919				
1920	51,529	39,932	7,278	18.23
1921	109,658	75,022	13,995	18.65
1922				
Tolylenediamine—				
1921	175	238	40	16.48
1922				
Xylidine—				
1917				
1918				
1919				
1920	56,047	41,237	7,587	18.40
1921				
1922				
All distillates, n. s. p. f., which on distillation yield in the portion distilling below 200° C. a quantity of tar acid equal to or more than 5 per cent of the original distillate:				
1917				
1918	1,550	2,008	340	16.93
1919	3,170	4,587	767	16.73
1920	85,474	36,041	7,543	20.93
1921	16,240	11,811	2,178	18.43
1922 [a]	328,601	33,784		
1922 [b c]	22,163	9,128		
All distillates of coal, blast-furnaces, oil-gas, and water-gas tar which on being subject to distillation below 215° C. a quantity of tar acids equal to or more than 75 per cent of the original distillate:				
1922	18,257	4,102		
All similar products, obtained, derived, or manufactured in whole or in part from the products provided for in Group I (free):				
1917	193,021	17,595	7,465	42.43
1918	13,445	8,640	1,632	18.89
1919	51,214	39,861	7,260	18.21
1920	87,911	74,514	13,375	17.95
1921	87,207	41,965	8,475	20.19
1922 [a]	389,708	153,625		
1922 [b]	187,377	61,967		
All sulfoacids or sulfoacid salts of Group II:				
1917				
1918				
1919				
1920	100	87	16	17.88
1921	6,789	2,944	611	20.76
1922 [a]	11,374	12,058		

[a] Act of 1916. [b] Act of 1922. [c] At 190° C. instead of 200° C.

TABLE 58.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1922*—Continued.

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)

Article and year.	Pounds.	Value.	Duty.
When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives:			
Alizarin, natural—			
1917	6,899	$12,216	$3,665.00
1918	108,711	158,816	47,644.80
1919	6,684	8,612	2,583.60
1920	58,583	41,381	12,414.30
1921	59,306	81,816	24,544.80
1922 [a]	28,309	63,304	
1922 [b]	1,547	3,094	
Alizarin, synthetic—			
1917	19,180	55,179	16,554.00
1918			
1919			
1920	73,232	24,072	7,221.60
1921	136,283	49,707	14,912.10
1922 [a]	21,614	22,199	
Dyes obtained, derived, or manufactured from alizarin—			
1917	34	75	22.50
1918	6,446	13,399	4,019.70
1919	1,920	3,864	1,159.20
1920	29,436	25,489	7,646.70
1921	246,837	356,658	106,997.40
1922 [a]	293,005	468,134	
1922 [b]	56,294	82,981	
Dyes obtained, derived, or manufactured from anthracene and carbazol—			
1917	23,146	11,326	3,398.00
1918	12,827	20,087	6,026.10
1919	7,162	7,772	2,331.60
1920	216,508	208,754	62,626.20
1921	226,956	422,941	126,882.30
1922 [a]	330,129	605,187	
1922 [b]	17,697	26,002	
Indigoids, whether or not obtained from indigo—			
1917	129,983	140,932	42,280.00
1918	3,376	13,744	4,123.20
1919	34,049	82,779	24,833.70
1920	86,439	196,783	59,034.90
1921	76,123	72,154	21,646.20
1922 [a]	184,886	267,059	
Colors, dyes, stains, etc., derived from indigo—			
1922 [b]	872	1,482	
Flavors—			
1917	35	408	122.00
1918	160	816	244.80
1919			
1920	14	27	8.10
1921			
1922			
Indigo, natural—			
1917	2,261,122	4,230,510	1,269,153.00
1918	1,637,914	2,007,958	602,387.40
1919	234,991	285,925	85,777.50
1920	36,537	69,528	20,858.40
1921	77,121	154,538	46,361.40
1922 [a]	14,461	19,074	
1922 [b]			
Indigo, synthetic—			
1917	1,379,349	871,267	261,380.00
1918	690,414	342,589	102,776.70
1919	537,697	327,133	98,139.90
1920	171,101	207,299	62,189.70
1921	70,975	84,901	25,470.30
1922 [a]	86,585	123,702	
1922 [b]			
Medicinals—			
1917		284,346	85,304.00
1918		301,074	90,322.20
1919		168,466	50,539.80
1920		165,055	49,516.50
1921		280,299	84,089.70
1922 [a]		154,620	
1922 [b] [c]	7,937	24,410	

[a] Act of 1916. [b] Act of 1922. [c] Other coal-tar medicinals.

TABLE 58.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1922*—Continued.

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922.)—Continued.

Article and year.	Pounds.	Value.	Duty.	Actual and computed ad valorem rate.
When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives:				
Colors, or color lakes obtained, derived, or manufactured from alizarin—				
1917	7,062	$18,680	$5,957.00	31.89
1918	1,499	4,490	1,421.95	31.67
1919	15,358	14,405	5,089.40	35.33
1920	98,735	172,841	56,789.05	32.86
1921	59,290	66,171	22,815.80	34.48
1922 [a]	79,542	62,986	.....	.....
1922 [b]	.....	.....	.....	.....
Colors, or color lakes obtained, derived, or manufactured from anthracene and carbazol—				
1917	53,205	49,729	17,579.00	35.35
1918	27,900	22,545	8,158.80	36.19
1919	38,073	55,475	18,545.15	33.43
1920	260,060	529,966	171,992.80	32.45
1921	62,748	65,635	22,827.90	34.78
1922 [a]	27,535	63,102	.....	.....
1922 [b]	.....	.....	.....	.....
All other colors, dyes, or stains, whether soluble or not in water, color acids, color bases, or color lakes—				
1917	2,257,476	2,574,363	885,183.00	34.38
1918 [c]	1,799,467	2,161,799	738,513.05	34.16
1919	1,991,687	2,848,294	954,072.55	33.50
1920	2,807,807	4,093,389	1,368,407.05	33.43
1921	2,751,535	3,968,319	1,328,072.45	33.47
1922 [a]	2,077,712	2,941,773	.....	.....
1922 [b]	677,849	894,844	.....	.....
Phenolic resin, synthetic—				
1917	134,702	11,596	10,214.00	88.08
1918	.....	.....	.....	.....
1919	1,114	2,860	913.70	31.95
1920	2,479	2,681	928.25	34.63
1921	1,420	2,366	780.80	33.00
1922 [a]	762	1,404	.....	.....
1922 [b]	1,756	2,094	.....	.....
Resinlike products prepared from articles provided for in pars. 25 and 1549:				
Photographic chemicals—				
1917	12,632	101,406	31,053.00	30.62
1918	14,550	108,537	31,248.60	30.67
1919	12,059	77,876	24,[illegible].75	30.77
1920	21,808	67,640	21,[illegible]82.40	31.61
1921	29,281	65,906	21,2[illegible].8[illegible]	32.22
1922 [a]	3,287	4,405	.....	.....
1922 [b]	8,183	8,208	.....	.....
Acetanilid (25 per cent), 1919	124	50	12.00	25.00
Acetphenetidin (25 per cent):				
1917	3,280	40,352	10,088.00	25.00
1918	.....	.....	.....	.....
1919	.....	.....	.....	.....
1920	.....	.....	.....	.....
1921	.....	.....	.....	.....
Acetylsalicylic acid (25 per cent):				
1917	1,474	4,670	1,168.00	25.00
1918	.....	.....	.....	.....
1919	26	76	19.00	25.00
1920	.....	.....	.....	.....
1921	.....	.....	.....	.....
1922	.....	.....	.....	.....
Antipyrene (25 per cent):				
1917	21,842	62,411	15,603.00	25.00
1918	9,416	106,643	26,661.00	25.00
1919	13,736	135,565	33,891.00	25.00
1920	14,737	53,293	13,323.00	25.00
1921	.....	.....	.....	.....
1922 [a]	.....	.....	.....	.....
1922 [b]	913	1,740	.....	.....

[a] Act of 1916.
[b] Act of 1922.
[c] Does not include 110 pounds, valued at $322, duty $81.68, from Cuba.

TABLE 58.—*Imports of coal-tar products entered for consumption, calend 1917 to 1922*—Continued.

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM: DUTIABLE AT 60 PE AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922.)—Co

Article and year.	Pounds.	Value.	Duty.
Benzaldehyde, 1922 [b]	571	$914	
Phenolphthalein (25 per cent):			
1917			
1918	100	1,200	$300.00
1919			
1920	200	726	181.00
1921	5,055	2,385	596.25
1922 [b]	1,487	8,877	
Saccharin (65 cents per pound):			
1917	554	6,544	360.00
1918			
1919			
1920	40	39	26.00
1921	46	103	29.90
1922 [b]	1	14	

[b] Act of 1922.

TABLE 59.—*General imports of coal-tar products, by countries, calendar years 1918–1922.*

DEAD OR CREOSOTE OIL (FREE).

Imported from—	1918		1919		1920		1921		1922	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Gallons.		*Gallons.*		*Gallons.*		*Gallons.*		*Gallons.*	
England			8,934,045	$1,085,617	12,514,150	$2,568,235	19,465,981	$3,114,867		
Scotland	1,125	$862	60,756	10,462	147,377	21,096	819	189		
Canada	1,543,660	161,693	2,273,578	278,138	1,619,993	227,624	374,845	64,713		
All other	462	314			[1] 4,145,722	979,444	13,397,787	1,576,849		
Total	1,545,247	162,869	11,268,379	1,374,217	18,427,152	3,796,399	33,239,432	4,756,618	41,567,537	$4,240,449
	BENZOL.									
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
Canada	1,315,696	$33,303	217,865	$5,617	486,619	$10,868	1,562,951	$39,020		
All other							159,134	3,350		
Total	1,315,696	33,303	217,865	5,617	486,619	10,868	1,722,085	42,370	172,528	$1,223
	CRESOL.									
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
England	3,051,833	$256,917	4,935,748	$468,407	6,037,223	$509,710	1,708,992	$139,737		
Scotland	1,676,354	196,116	1,516,610	149,373	4,198,397	382,637	934,842	86,380		
Canada			800	1,028	16,400	1,360	4,600	501		
Germany					66,050	7,674	705,448	27,268		
Total	4,728,187	453,033	6,453,158	558,808	10,318,070	901,381	3,353,882	253,886		
	NAPHTHALENE.									
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
United Kingdom	424,147	$13,253	1,342,091	$47,076	10,155,579	$357,954	2,644,997	$83,353		
Belgium					413,274	16,972	96,928	5,412		
Canada	1,328,496	44,540	1,836,478	43,795	2,959,976	78,704	1,708,868	44,541		
Germany					381,740	34,135	42,683	2,383		
Japan			612	42	98,695	7,653	2,320	252		
Italy					494,644	17,077				
Australia			60,075	1,352	168,923	3,528				
All other					339,340	14,198				
Total	1,752,643	57,793	3,239,256	92,265	15,012,171	530,221	4,495,796	135,941	3,144,332	$54,029

[1] All from Netherlands, except 6 gallons from Japan.

TABLE 59.—*General imports of coal-tar products, by countries, calendar years 1918–1922*—Continued.

TAR AND PITCH OF COAL.

Imported from—	1918		1919		1920		1921		1922	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		*Barrels.*		*Barrels.*		*Barrels.*		*Barrels.*	
England	51	$686	600	$2,725	1,127	$4,166	7	$82	.....	.....
Scotland	.....	.....	100	256	580	3,706	.....	.....	.....	.....
Canada	26,499	49,069	25,003	44,093	18,824	41,940	21,948	47,913	.....	.....
All other	.....	.....	.....	.....	150	350	13	53	.....	.....
Total	26,550	49,755	25,703	47,074	20,681	50,162	21,968	48,048	24,853	$58,517
	TOLUOL.									
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
Canada	.....	.....	1,195,706	$30,768	.....	.....	.....	.....	.....	.....
Total	.....	.....	1,195,706	30,768	.....	.....	.....	.....	144,237	$6,061
	ALL OTHER CRUDES.									
France	.....	$823	.....	$54	.....	$10,903	.....	$1,507	.....	.....
England	.....	57,364	.....	42,875	.....	178,866	.....	19,015	.....	.....
Scotland	.....	825	.....	870	.....	1,581	.....	.....	.....	.....
Canada	.....	104,765	.....	1,891	.....	876	.....	540	.....	.....
Germany	.....	.....	.....	.....	.....	9,179	.....	352	.....	.....
All other	.....	.....	.....	.....	.....	2,896	.....	4	.....	.....
Total	.....	163,777	.....	45,690	.....	204,381	.....	21,718	.....	$380,122

Imported from—	Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, free.		Carbolic acid, dutiable (phenol).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
England	155,236	$17,260	208,037	$54,884	1,619,823	$158,820	2,061	$264
Canada			75,300	7,613				
Scotland					345,466	28,968		
Total	155,236	17,260	283,337	62,497	1,965,289	187,788	2,061	264

Imported from—	1920				1921				1922	
	Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, dutiable.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
England	178,652	$18,258	1,040	$244	205,113	$21,841	250	$142		
Scotland	14,040	1,590								
Canada					9,072	1,008				
Total	192,692	19,848	1,040	244	214,185	22,849	250	142	686,304	$102,282

ALL OTHER ACIDS.

Imported from—	1918		1919		1920		1921		1922	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
England	125	$1,114	63	$374	250	$1,087				
Japan	5	2								
France					11,199	8,182				
Germany					309	500	11,263	$3,012		
Total	130	1,116	63	374	11,758	9,769	11,263	3,012	73,859	$17,561

TABLE 59.—*General imports of coal-tar products, by countries, calendar years 1918–1922*—Continued.

ANILINE OIL.

Imported from—	1918		1919		1920		1921		1922	
France					*Pounds.* 220	$72				

ANILINE SALTS.

(Free under act of 1909; dutiable under act of Oct. 3, 1913, and under the act of Sept. 8, 1916.)

Imported from—	1918		1919		1920		1921		1922	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
England	21,273	$3,250					18,301	$12,029		
Germany					4	$1	15	80		
Total	21,273	3,250			4	1	18,316	12,109		

ALL OTHER INTERMEDIATES.

Imported from—	1918	1919	1920	1921	1922	
Belgium			$41,291	$18,774		
France		$26,611	140,095	62,028		
Germany			191,732	80,306		
Italy			17,491	740		
England	$15	48,722	302,235	98,502		
Straits Settlements			41,237			
Japan	4,348	82	68,323	15		
Canada		20,788		40,587		
All other			29,264	40,650		
Total	4,363	96,203	831,668	341,602	302,310	

INDIGO.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918				1919			
	Indigo, natural (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Switzerland	25,762	$38,719	770,212	$410,421	15,796	$29,857	726,440	$388,067
England	264,975	463,510	6,817	5,587	10,584	16,647	1,468	1,970
British India	1,138,176	1,284,434	.....	.....	99,597	99,901	.....	.....
Salvador	234,452	299,554	.....	.....	60,940	67,262	8,400	5,729
All other	83,709	108,150	.....	.....	40,557	46,448	87,570	36,607
Total	1,747,074	2,194,367	777,029	416,008	227,474	260,115	823,878	432,373

Imported from—	1920				1921				1922			
	Indigo, natural (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
Switzerland	57,411	$150,957	285,153	$252,708	27,366	$55,142	59,873	$101,073	.....	.....	.....	.....
England	27,269	51,556	1,229	361	9,245	9,857	6,895	5,045	.....	.....	.....	.....
Salvador	10,214	20,296	.....	.....	13,158	11,112	.....	.....	.....	.....	.....	.....
France	50,066	70,008	400,589	172,692	.....	.....	331,320	87,407	.....	.....	.....	.....
Germany	4,346	5,171	25,029	18,220	882	2,382	2,829	2,288	.....	.....	.....	.....
India	2,850	7,392	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Italy	.....	.....	54,422	37,311	.....	.....	532	128	.....	.....	.....	.....
All other	48	48	.....	.....	1,838	7,202	6,813	4,962	.....	.....	.....	.....
Total	152,204	305,428	766,422	481,292	52,489	85,695	408,262	200,903	12,450	13,848	72,218	101,448

TABLE 59.—*General imports of coal-tar products, by countries, calendar years 1918-1922*—Continued.

ALIZARIN AND ALIZARIN DYES.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918		1919		1920		1921		1922	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
Germany					141,213	$197,562	285,007	$393,374		
Switzerland	440	$572	220	$2,517	222,417	81,393	110	374		
United Kingdom	4,310	3,739	23,417	21,084	25,196	18,898	44,026	54,869		
Canada	1	2	215	414	297	1,806	2	5		
Japan	15,141	58,948								
Belgium					46,283	32,857	13,280	9,964		
Netherlands					5,906	10,314	12,483	21,582		
All other	500	7,629	23	265	444	689	20,204	29,870		
Total	20,392	70,890	23,875	24,280	441,756	343,519	375,112	510,038	479,858	$701,943

COAL-TAR COLORS OR DYES (DUTIABLE).

Imported from—	1918, value.	1919		1920		1921		1922[1]	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Belgium		36,958	$63,119	190,414	$153,020	31,813	$56,481		
France	$76,506	11,746	20,853	70,821	100,884	62,468	90,328		
Germany		143,031	83,563	1,155,501	1,565,300	1,050,028	1,718,776		
Switzerland	1,762,688	1,284,199	2,176,463	1,372,490	2,693,653	1,504,970	2,005,265		
England	561,699	609,703	664,548	345,889	394,668	287,377	358,403		
All other	68,546	165,760	160,730	351,758	351,277	169,699	216,035		
Total	2,469,439	2,215,397	3,169,276	3,486,873	5,258,802	3,106,355	4,445,348	2,553,576	$3,762,841

Imported from—	1918 [1]	1919	1920	1921	1922
France	$11,900				
Netherlands	50				
Switzerland	3,045				
England	47,548				
Mexico	32				
Total	62,575				

MEDICINAL PREPARATIONS.

Imported from—	1918 [2]	1919	1920	1921	1922 [3]
France	$32,129	$58,749	$21,724	$45,378	
Germany			59,133	124,862	
Italy		1,329	8	60	
Netherlands		12,257	21,203	11,680	
Spain		94	523	268	
Switzerland	154	1,761	18,571	39,151	
England	7,499	20,302	40,339	59,681	
Scotland		137	87		
Canada	53,324	77,162		1	
Peru	114				
Venezuela		69	7		
Japan	6,142	351	162	299	
All other	10		3,816	10,229	
Total	99,372	172,211	165,573	281,609	$1,305,111

ALL OTHER FINISHED PRODUCTS.

Imported from—	1918 [2]	1919	1920	1921	1922
France	$4,162	$25,955	$37,192	$39,314	
Germany			21,406	6,518	
Switzerland	2,901	1,447	6,715	15,011	
England	54,502	57,166	10,307	2,657	
Canada	816				
All other			29	302	
Total	62,381	84,568	75,649	63,802	

[1] Jan. 1–June 30, 1918. [2] July 1–Dec. 31, 1918. [3] Jan. 1–Sept. 21.

TABLE 60.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1922.*

COAL TAR.

Exported to—	1918		1919		1920		1921		1922	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		*Barrels.*		*Barrels.*		*Barrels.*		*Barrels.*	
Europe	2,069	$12,297	230	$900	243	$1,441	212	$1,394	.....	.....
North America	54,149	139,456	71,749	158,205	74,374	208,561	91,716	185,063	.....	.....
South America	808	6,288	2,759	20,166	3,725	23,656	457	3,125	.....	.....
Asia	198	1,505	475	3,174	10	65	17	1,857	.....	.....
Oceania	154	1,739	45	301	81	995	.....	.....	.....	.....
Africa	1,176	7,435	1,334	15,757	17	49	4	43	.....	.....
Total	58,554	168,720	76,592	198,503	88,350	234,767	92,406	191,482	.....	.....

COAL-TAR DISTILLATES, n. e. s.

BENZOL.

	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
France	32,599,682	$1,854,216	12,319,900	$407,622	2,528,494	$138,850	24,344,624	$1,095,063	.....	.....
Chile	.....	.....	.....	.....	229,079	16,760	.....	.....	.....	.....
England	.....	.....	113,300	10,197	57,500	4,970	46,073,896	1,797,780	.....	.....
Germany	.....	.....	.....	.....	669,494	36,902	.....	.....	.....	.....
Canada	136,571	7,389	335,799	21,313	389,783	23,904	44,725	287	.....	.....
Belgium	.....	.....	.....	.....	3,150,240	238,617	.....	.....	.....	.....
Argentina	75,442	7,329	973,978	60,563	353,522	23,907	549,896	37,571	.....	.....
Japan	136,480	8,680	280,442	18,590	67,200	6,720	900	81	.....	.....
Italy	299,659	22,704	.....	.....	4,961,878	357,956	348,880	22,030	.....	.....
All other	46,743	4,042	215,000	16,847	767,078	79,354	667,479	54,355	.....	.....
Total	33,294,577	1,904,360	14,238,419	535,132	13,174,268	927,940	72,030,400	3,007,086	64,740,402	$2,362,821

ALL OTHER COAL-TAR DISTILLATES (VALUE).

Exported to	1918	1919	1920	1921	1922
France	$2,188,439	$33,387	$445,520	$10,347	.....
Belgium	345,407	18,674	474,703	.....	.....
Italy	927,295	127,583	296,449	.....	.....
England	.....	.....	1,632,509	28,408	.....

All other	159,377	336,903	69,016	116,193	
Total	5,867,830	1,103,750	6,962,249	509,508	$91,342

DYES AND DYESTUFFS (VALUE).

Exported to—	Calendar years.					
	1918			1919		
	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.
Portugal	$176,769	$10,541	$131,280	$70,296	$2,319	$36,063
Belgium				90	34,787	19,193
France	6,345	263,610	496,875	127,059	596,042	229,689
Germany				150	290	
Italy	274,903	70,237	234,238	269,130	58,716	180,359
Netherlands				26,284	21,735	9,104
Russia			12,825	8,570		
Switzerland	22,500	7,728	5,000	193	22,824	
United Kingdom	380,181	345,458	524,576	413,700	304,686	423,719
Canada	836,445	82,292	724,522	1,015,334	119,871	1,007,892
Mexico	289,327	5,666	181,029	467,806	17,438	230,359
Central America	5,617	400	5,498	5,941	892	14,544
West Indies	23,447	742	35,473	34,307	137	40,900
South America	1,719,408	128,645	931,600	1,651,872	66,099	585,127
Asia	4,248,367	504,542	2,720,399	5,565,053	48,063	1,921,202
Oceania	100,490	20,194	133,493	177,964	14,041	143,223
Africa	3,993	715	15,534	45,566	1,508	8,281
Denmark			1,055	5,334	9,671	2,438
Spain	518,895	104,748	472,222	535,383	18,349	84,544
Sweden				22,694	8,584	15,708
Norway		985	4,529	13,663	1,300	7,303
All other	22,924	4,877	6,761	267,682	8,584	44,780
Total	8,629,611	1,551,380	6,636,099	10,724,071	1,355,936	5,004,428

TABLE 60.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1922*—Continued.

DYES AND DYESTUFFS (VALUE)—Continued.

Exported to—	1920			1921			1922		
	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.
Portugal	$66,752	$5,970	$20,688	$1,432					
Belgium	507,371	118,339	41,523	100,821	$6,843	$45			
France	807,241	607,017	391,060	67,535	66,762	8,334			
Germany	454	1,456	7,745	653	13,885	6,352			
Italy	582,236	404,367	275,149	45,068	8,723	70			
Netherlands	39,682	73,472	56,057	1,938	2,535	6,590			
Russia (European)	100								
Switzerland	132,359	60,157	92,017	20,374		19			
United Kingdom	1,318,498	729,026	1,079,871	165,711	21,096	58,630			
Canada	1,547,109	183,061	982,665	584,664	71,331	423,914			
Mexico	1,091,603	11,092	210,145	149,009	3,560	132,075			
Central America	13,159	1,852	13,730	7,982	975	5,680			
West Indies	52,745	18,144	97,922	1,585	91	2,057			
South America	2,282,210	45,586	497,029	432,881	16,466	89,156			
Asia	12,783,303	195,493	3,208,107	3,131,071	347,610	333,709			
Oceania	277,660	41,283	134,196	207,473	13,190	51,743			
Africa	65,077	1,248	28,251	61,699	486	13,179			
Denmark	26,463	2,903	2,794	1,305		3,849			
Spain	682,998	77,183	149,365	36,844	535	12,040			
Sweden	67,921	1,250	29,802	2,786		8,976			
Norway	4,568	1,110	15,998	1,800		1,304			
All other	100,971	25,051	38,997	44,369	15,868	45,433			
Total	22,450,480	2,605,060	7,373,111	5,067,000	589,756	1,203,155		$448,713	

IMPORTS FOR CONSUMPTION.

Calendar year.	Ink and ink powders, 1922.		Printer's ink.			Writing and copying ink.			All other, including ink powders.		
	Quantity.	Value.	Rate of duty.	Value.	Duty collected.	Rate of duty.	Value.	Duty collected.	Rate of duty.	Value.	Duty collected.
			Per cent.			*Per cent.*			*Per cent.*		
1918			15	$4,154	$623	15	$13,363	$2,004	15	$6,343	$951
1919			15	199	30	15	15,116	2,267	15	8,143	1,221
1920			15	15,228	2,284	15	15,505	2,326	15	10,657	1,599
1921			15	5,554	833	15	4,625	694	15	10,813	1,622
1922	[1] 33,783	[1] $13,132									

DOMESTIC EXPORTS.

Exported to—	Calendar years.									
	1918		1919		1920		1921		1922	
	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.
Europe	$48,394	$25,371	$210,482	$68,382	$224,129	$96,699	$101,914	$71,818		
North America	256,507	206,360	320,008	297,959	366,784	328,889	321,389	200,361		
South America	353,023	100,833	603,758	210,212	535,265	208,272	140,612	49,336		
Asia	224,345	67,736	435,664	155,420	579,843	187,988	291,719	75,867		
Oceania	116,424	42,452	113,288	109,962	171,640	105,964	108,453	45,017		
Africa	42,189	5,429	29,726	14,282	15,091	8,887	6,743	6,700		
Total	1,040,882	448,181	1,712,926	856,217	1,892,752	936,719	970,830	449,099	993,352	328,978

[1] Beginning Sept. 22, 1922.

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Census of Dyes
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INTRODUCTION

This report is a survey of the domestic dye and synthetic organic chemical industry in 1923. It presents the results of a special investigation made by the United States Tariff Commission as to the production in the United States of coal-tar dyes and synthetic organic chemicals, both of coal-tar and of noncoal-tar origin. It includes a detailed census of dye imports and official pre and post war statistics for the imports and exports of coal-tar dyes by the large consuming and producing nations of the world.

The survey is divided into six parts, as shown in Table of Contents (pp. III to VI).

In the preparation of this report the Tariff Commission had the services of Warren N. Watson, Frank Talbot, and C. R. De Long, of the chemical division of the commission's staff, and of others.

PART I

MMARY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1923

PART I

MMARY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1923

INTRODUCTORY

The United States Tariff Commission has reported annually, ginning with 1917, the progress of the American dye and coal-tar emical industry. Since 1919, the production figures on dyes and er coal-tar chemicals have been supplemented by a detailed sus of dye imports. Since 1921 the annual census of the industry included a census of synthetic organic chemicals other than those ived from coal tar. A discussion of the international dye trade also included, developments in the foreign dye-producing coun- es are considered, and information is given on the production of es in France, Italy, and Japan. Official statistics as to exports d imports of the more important dye-consuming and producing ntries of the world in post-war years are compared with those of e-war years. A new feature of the present report is the account the deliveries and the percentage distribution of reparation dyes, gether with the agreements and protocols concerning the German liveries of both dyes and pharmaceuticals to the allied and associ- ed Governments.

Other reports prepared by the Tariff Commission relating to con- ions in the dye industry include (1) Costs of Production in the e Industry, 1918 and 1919, and (2) Dyes and Other Coal-Tar emicals, December 12, 1918.

The general grouping of coal-tar chemicals adopted in the present port follows that of the tariff act of 1922, which conforms in gen- al, although not in every detail, with common practice. Crudes, ragraph 1549, free, are contained in and separated from crude al tar; intermediates, dutiable under paragraph 27 at 55 per cent d 7 cents per pound, are produced from the crudes by chemical ocesses; with some exceptions, they are used only for the manu- ture of dyes and other finished products by further chemical atment; dyes and other finished products are dutiable under para- ph 28 at 60 per cent and 7 cents per pound. The term "other shed products" includes color lakes, photographic chemicals, dicinals, flavors, perfume materials, synthetic resins, and synthetic ning materials. Explosives, derived from coal-tar materials, hough dutiable under paragraph 28, are not included in this sus. A summary of the production of coal-tar products in 1923 ording to the classes given above, is contained in Table 1. The ures of production of dyes and coal-tar chemicals in the United tes are compiled from the returns of 206 companies, and are ieved to form a complete record of the manufacture of such ducts in that year. In presenting the figures the quantity and ue of each product are given in as great detail as is possible with- revealing the operations of individual manufacturers.

Summary of Domestic Production, 1923

CRUDES

A new record for the output of by-product coke was established in 1923, when the total production was 37,604,743 tons, an increase of 6,770,792 tons over the 1920 output, hitherto the maximum. The total production of coke in 1923 was 55,565,000 tons; of this quantity 67.7 per cent was from by-product ovens and 32.3 per cent from beehive ovens. In 1913 only 27.5 per cent of this country's coke was produced by the by-product ovens and 72.5 per cent by the beehive. The increase in the production of by-product coke has resulted in (1) an increased yield of valuable by-products, including ammonium compounds, for fertilizer and other uses, (2) the supply of gas used for industrial heating and municipal lighting, and (3) a delivery of coal tar far in excess of the needs of the domestic coal-tar chemical industry. The tar is converted by distillation into crudes, which serve as the basic materials for the domestic coal-tar chemical industry. The production of tar in 1923 established a record, reaching 440,000,000 gallons, about one-half of which was used as fuel. Only a part of the remainder was distilled into refined products, owing to the large demand for such partly refined products as motor fuel, solvents, and pitches. In general, there was an increased output of crudes during 1923, conspicuous among them being "motor benzol" and naphthalene. For the first time, the total domestic production of crudes from all sources has been combined, as shown in Table 6. The Geological Survey collects information on by-products obtained from coke-oven operations, the data being in Table 5. The United States Tariff Commission collects data as to the output of crudes by firms primarily engaged in tar distillation, and the results are summarized in Table 7.

INTERMEDIATES

The total production of intermediates by 103 firms in 1923 was 231,393,871 pounds compared with 165,048,155 pounds for 1922. The sales during 1923 totaled 83,582,808 pounds, valued at $18,916,058. The average sales price of intermediates in 1923 was $0.226 as compared with $0.22 for 1922 and $0.33 in 1917. Although the average price of intermediates changed but slightly during 1922 and 1923, it should be borne in mind that in 1923 there was an increased output of the more costly products, tending to increase the average price of intermediates. The average sales price of aniline, the most important of all intermediates, was $0.16 for 1923 as compared with $0.15 for 1922. The sales price of H acid decreased from $0.73 in 1922 to $0.68 in 1923, b-naphthol (tech) receded from $0.24 to $0.22, and anthraquinone, required for the manufacture of alizarin, alizarin dyes and vat dyes (anthraquinone derivatives) fell from $1.34 to $0.95 per pound. The total number of intermediates reported during 1923 was 311, of which over 80 were not reported during the previous year. Many of these additions to the country's manufacturing program are essential materials for the manufacture of the faster types of dyes and are also used in the production of other important coal-tar derivatives. The manufacture of these in the United States constitutes a noteworthy advance in the domestic industry. Coal-tar intermediates are required not only for the manu-

facture of dyes but also in the production of explosives, medicinals, flavors, perfume materials, photographic chemicals, synthetic resins, synthetic tanning materials and accelerators for the vulcanization of rubber.

DYES

Record production during 1923.—The domestic output of coal-tar dyes in 1923 by 88 firms was 93,667,524 pounds, compared with 64,632,187 pounds in 1922. The sales for the year 1923 totaled 86,567,446 pounds, valued at $47,223,161. The present dye industry is largely a development of the war and post-war period. The pre-war production in 1914 of seven firms was 6,619,729 pounds, valued at $2,470,096. Production in that year was dependent upon foreign countries, as most of the intermediates were imported, chiefly from Germany. Among the more important factors responsible for the large output of dyes during 1923 may be mentioned (1) the activity of the domestic textile and dye-consuming industries, (2) the occupation of the Ruhr, which caused a reduction in the output of the German dye factories and consequently enabled domestic producers to increase their exports of indigo, sulphur black, and certain other dyes, principally to the markets of the Far East, (3) the relatively high foreign price level of dyes as compared with those of the pre-war period, and (4) the effect of the tariff act of 1922.

Further reduction in prices.—The average selling price of all dyes in 1923 was 10 per cent below that of 1922. The average sales price for 1923 was $0.545 per pound, compared with $0.60 in 1922, $0.83 in 1921, and $1.26 in 1917, the first year for which a census of dyes of coal-tar chemicals was compiled by the Tariff Commission.

Continued advancement in the production of new dyes.—During 1923 nearly 100 new dyes were produced for which no production had been shown in 1922. In addition, other colors, heretofore reported in small quantities, were manufactured on a substantial commercial scale. These comprise for the most part special dyes of greater complexity, and more difficult and costly to manufacture. In most cases they do not individually represent a large tonnage. Their production, however, affords a better balance to the country's manufacturing program and reduces the number of dyes previously imported for special uses. The additions include colors for use on silk, cotton, wool, color lakes and for other purposes, and are representative of the different classes of dyes by chemical classification. Their production has, in many cases, already been reflected in a decline in the corresponding imports. The domestic industry, although to some extent deficient in the production of certain vat dyes and other colors, supplies over 95 per cent of the domestic requirements.

Relation of production to consumption.—Imports of dyes in 1923 were 3.3 per cent of the total production by quantity and 6.2 per cent by value. They were, by quantity, 3.9 per cent of the apparent consumption; assuming this to equal production plus imports minus exports. Dyes produced in the United States accordingly supplied about 96 per cent of the apparent consumption of coal-tar dyes and there was, in addition, an exportable surplus of certain coal-tar dyes amounting to about 18,000,000 pounds.

Production of dyes by classes.—The output of dyes in 1923, grouped by classes according to the method of application, was as follows:

Acid dyes, 12,498,817 pounds, or 13.34 per cent of the total output; basic dyes, 4,157,373 pounds, or 4.44 per cent; direct cotton dyes, 16,858,387 pounds, or 18 per cent; mordant and chrome dyes, 4,078,504 pounds, or 4.35 per cent; sulphur dyes, 21,558,469 pounds, or 23.02 per cent; vat dyes, including indigo, 30,113,642 pounds, or 32.15 per cent; indigo, 28,347,259 pounds, or 30.26 per cent; other vat dyes, 1,766,383 pounds, or 1.89 per cent; lake and spirit-soluble dyes, 1,171,854 pounds, or 1.25 per cent; unclassified and specialty dyes, 3,230,478 pounds, or 3.45 per cent of the total.

Imports of dyes decline.—The total imports of coal-tar dyes for 1923 were 3,098,193 pounds, valued at $3,151,363, compared with 3,982,631 pounds, valued at $5,243,257, for the year 1922. Total imports during 1913, prior to the extensive development of the domestic dye industry, were 45,950,895 pounds. Of the total imports during the year 1923, 47 per cent came from Germany, 28 per cent from Switzerland, 12 per cent from Italy, 6 per cent from France, 4 per cent from England, and 3 per cent from all other countries. Dye imports in 1923, classified by method of application, were as follows: Acid dyes, 544,048 pounds; vat dyes, 1,207,554 pounds; mordant and chrome dyes, 453,415 pounds; direct dyes, 527,014 pounds; sulphur dyes, 114,023 pounds; basic dyes, 210,896 pounds; spirit-soluble and color lake dyes, 23,213 pounds; and unidentified, unclassified and special dyes 18,030 pounds. The Swiss dye manufacturers have a much larger share of the domestic import trade—28 per cent in 1923, 39 per cent in 1922, and about 20 per cent in 1914—than the size of the Swiss industry, compared with that of Germany, would imply. The Ruhr occupation undoubtedly favored Swiss dye exports. Swiss dyes are for the most part of the higher-cost specialty type, to which most of the dyes imported into this country belong. Dyes shipped from Italy appear to be of German manufacture and are doubtless dyes delivered to Italy by Germany in reparation payment and later sold to the United States. Italy received up to December 31, 1923, 6,274,601 kilos (13,832,985 pounds) out of a total delivery by Germany in reparation payment of 25,583,390 kilos (56,401,142 pounds) of coal-tar dyes.

Exports of dyes increase.—The exports of coal-tar dyes during 1923 totaled 17,924,200 pounds, with a value of $5,565,267, compared with a total of 8,344,187 pounds, with a value of $3,996,443, during 1922. This increase in the domestic exports of coal-tar dyes may be largely accounted for by the effect of the occupation of the Ruhr by the French, which resulted in a decreased production of dyes in the German factories and consequently gave domestic manufacturers an opportunity to increase their exports to Far Eastern markets.

OTHER FINISHED COAL-TAR PRODUCTS

Color lakes.—The total output of this class of pigments in 1923 was 13,079,115 pounds, compared with 10,578,664 pounds in 1922. The total sales of color lakes in 1923 amounted to 12,627,359 pounds, valued at $5,124,732.

Photographic chemicals.—The 1923 production of coal-tar chemicals used as photographic developers totaled 343,289 pounds, compared with 345,798 pounds in 1922. Sales in 1923 amounted to 321,083 pounds, valued at $443,697.

icinals.—This class of coal-tar products may be considered ntial to the national welfare. The highest technical skill and st exhaustive research are required in the development and rcial production of these chemicals. The total production 3 was 3,273,085 pounds, and sales amounted to 2,995,448 , valued at $4,720,253. The 1922 production amounted to 47 pounds, with sales of 3,092,915 pounds, valued at $4,233,443.

imes and flavors.—These coal-tar products are closely related, members of the class being used both as flavors and as per-

The total output of flavors in 1923 was 1,458,024 pounds, ed with 1,215,668 pounds in 1922. Sales amounted to 87 pounds, valued at $1,780,313. The production of per- in 1923 was 1,365,449 pounds, compared with 793,148 pounds 2. Sales in 1923 amounted to 1,275,432 pounds, valued at 31.

hetic phenolic resins.—These products are used as substitutes ber in making pipe stems and a great variety of other articles, r electrical insulators, varnishes, and lacquers. The 1922 tion was 5,944,133 pounds; the figures for 1923 can not be ed without revealing the output of individual companies.

hetic tanning materials.—The output of these products ted to 1,910,519 pounds in 1922, but here, again, the 1923 tion figures can not be published without revealing the output ridual companies.

total output of synthetic phenolic resins and synthetic tanning ls in 1923 was 9,763,685 pounds. Each of these classes of r products shows an increase in production for the past year. tal sales of synthetic phenolic resins and synthetic tanning ls for 1923 was 10,068,431 pounds, valued at $5,816,590.

STATISTICS OF PRODUCTION

1.—*Summary of the production of dyes and coal-tar chemicals, 1918–1923*

	1918			1919		
	Number of manufacturers	Production		Number of manufacturers	Production	
		Pounds	Value		Pounds	Value
Intermediates	128	357,662,251	$124,382,892	116	177,362,426	$63,210,079
-Finished prod-		76,802,959	83,815,746	155	82,532,390	84,585,544
	78	58,464,446	62,026,390	90	63,402,194	67,598,855
akes	29	9,590,537	5,020,023	34	7,569,921	4,179,964
raphic chemi-	6	316,749	823,915	10	335,509	1,059,340
nals	31	3,623,352	7,792,984	31	6,777,988	7,883,071
	7	458,256	4,926,627	9	610,825	1,318,654
es	6	116,263	584,695	6	41,419	164,302
g materials	1	4,233,356	2,642,120	1	3,794,534	2,381,358
tic phenolic	5			5		

TABLE 1.—*Summary of the production of dyes and coal-tar chemicals, 1918–1923*—Continued

	1920			1921			
	Number of manufacturers	Production		Number of manufacturers	Production	Sales	
		Pounds	Value		Pounds	Pounds	Value
Group II—Intermediates	119	257,726,911	895,291,686	108	70,899,912	33,037,320	[illegible]
Group III—Finished products	161	112,942,227	112,731,547	147	51,457,865	60,434,609	[illegible]
Dyes	82	88,263,776	95,613,749	74	39,008,690	47,513,782	[illegible]
Color lakes	43	10,983,538	5,871,820	43	6,152,187	6,424,612	[illegible]
Photographic chemicals	8	440,759	1,015,848	7	183,798	170,221	[illegible]
Medicinals	35	5,184,989	5,726,776	34	1,545,917	1,876,246	[illegible]
Flavors	15	166,884	527,493	17	901,245	933,662	[illegible]
Perfumes	12	39,740	332,008	15	119,335	119,691	[illegible]
Tanning materials	4	3,142,861	233,674	4	1,902,397	1,721,359	[illegible]
Synthetic phenolic resins	4	4,659,680	3,410,179	3	1,643,796	1,474,456	[illegible]

	1922			
	Number of manufacturers	Production	Sales	
		Pounds	Pounds	Value
Group II—Intermediates	106	165,048,155	58,004,435	[illegible]
Group III—Finished products	164	88,368,131	93,370,065	[illegible]
Dyes	87	64,632,187	69,107,105	[illegible]
Color lakes	43	10,578,664	10,366,676	[illegible]
Photographic chemicals	7	345,798	347,647	[illegible]
Medicinals	35	2,946,347	3,092,915	[illegible]
Flavors	20	1,215,668	1,278,857	[illegible]
Perfumes	17	793,148	778,696	[illegible]
Tanning materials	4	1,910,519	1,981,388	[illegible]
Synthetic phenolic resins	5	5,944,133	6,415,931	[illegible]
Research chemicals	4	1,667	650	[illegible]

	1923			
	Number of manufacturers	Production	Sales	
		Pounds	Pounds	Value
Group II—Intermediates	103	231,393,871	83,582,808	[illegible]
Group III—Finished products	164	122,950,171	115,297,586	[illegible]
Dyes	88	93,667,524	86,567,446	[illegible]
Color lakes	43	13,079,115	12,627,350	[illegible]
Photographic chemicals	5	343,280	321,083	[illegible]
Medicinals	32	3,273,085	2,995,448	[illegible]
Flavors	16	1,458,024	1,442,387	[illegible]
Perfumes	20	1,365,449	1,275,432	[illegible]
Tanning materials	3	9,763,685	10,098,431	[illegible]
Synthetic phenolic resins	2			

SYNTHETIC ORGANIC CHEMICALS NOT DERIVED FROM COAL TAR

The Tariff Commission in 1921 compiled for the first time a census of organic chemicals other than those derived from coal tar or directly from natural sources. These included acids, alcohols, esters, ketones, aldehydes, derivatives of alkaloids, carbocyclic compounds, etc., used as perfume and flavoring ingredients, solvents, medicinals, also in industrial and other processes.

he development in the production of organic chemicals of non-
-tar origin has been comparatively unnoticed during past years,
use of the greater interest in the progress made in coal-tar chem-
. The rapid development in the past few years in these non-
-tar organic chemicals indicates the probability of further expan-
in this field, with the result that new products of great economic
e will continue to be placed on the market by domestic manu-
rers.

he production in 1923 of synthetic organic chemicals other than
e derived from coal tar was 90,597,712 pounds, with sales amount-
o 67,727,067 pounds, valued at $13,875,521. Production in 1922
led 79,202,155 pounds.

art IV of this report contains a detailed census of this group of
nic chemicals, showing production and sales in so far as the
lication of such figures does not disclose the output of individual
ufacturers.

International Dye Trade

re-war.—Prior to the war, Germany, with an output totaling
e-fourths of all synthetic dyes produced, dominated the world's
markets. Of the remaining one-fourth, one-half was made
n German intermediates, and its production was accordingly
endent upon Germany. Switzerland, although without a domes-
source of raw materials, ranked second, with about 7 per cent of
world's production. Great Britain produced about one-tenth
er requirements, and France produced in French-owned and
rated plants from 10 to 15 per cent of her consumption. In order
meet the patent requirements of France and Great Britain,
man manufacturers operated plants in those countries where the
l assembling operations were completed. The small dye industry
he United States was almost entirely dependent upon interme-
es from Germany.

evelopments since 1914.—The acute shortage of dyes arising in the
ous dye-consuming markets, due to the disappearance of German
s shortly after the beginning of the war, was soon followed by
es of unprecedented levels, while certain dyes were not to be had
ny price. This dye famine threatened the activities of the vast
ile industries as well as other industries dependent upon dyes
their operation. The manufacture of dyes was soon entered upon
he United States, Great Britain, France, and Italy, and each of
e countries has developed a dye industry capable of supplying
n 80 to over 90 per cent of its requirements and has, in addition,
rted significant quantities of dyes since the war. As a result of
remarkable period of expansion and development, the world's
ent capacity to produce dyes is nearly double that of the pre-
period. The estimated annual capacity to produce dyes by the
n leading producers—Germany, United States, Great Britain,
tzerland, France, Japan, and Italy—is considerably in excess of
000,000 pounds. The maximum estimated or officially reported
ut of the seven leading dye producers is as follows: Germany
3), 280,000,000 pounds; United States (1923), 94,000,000 pounds;
at Britain (1920), 43,000,000 pounds; Switzerland (1920), 24,000,000
nds; France (1923), 24,000,000 pounds; Japan (1919), 16,000,000

pounds; and Italy (1922), 10,000,000 pounds. This existing capacity to produce over and above normal requirements is resulting in an era of severe competition in the world's markets, which may eliminate many of the plants now in operation. Owing to the position of supremacy held by the German industry prior to the war, the future position of Germany's industry in the world's trade is of peculiar interest. Her export trade has suffered severely as a result of developments during and since the war. In 1913 the German export of synthetic dyes amounted to about 240,000,000 pounds, with a value of about $52,000,000, while in 1922 it amounted to about 114,000,000 pounds, with a value of about $80,000,000. For the year 1923 exports from Germany totaled about 74,000,000 pounds, with a value of about $17,000,000 (1913 basis) or $42,000,000 (1923 basis).

Table 22, page 126, shows the imports of dyes into the chief consuming countries for the years 1913, 1921, 1922, and 1923, and Table 21, page 125, shows the exports of coal-tar dyes from the chief producing countries for the same years. These two tables indicate the remarkable readjustment in the international dye trade due to developments during and since the war.

On account of the commanding position in the welfare of the German nation held by the chemical industry, it is highly probable that Germany will make every effort to regain her lost export trade, amounting to about nine-tenths of her total trade. One of the first steps in this direction has been to form affiliations in the new producing countries. Thus, in Italy it is reported that one of the largest dye producers, the Bianchi Co., has a working agreement under whose terms the Germans are to supply technical assistance and in return for which Germany shares profits; exports of dyes by this firm are restricted to the Italian colonies. In France, the Compagnie Nationale is reported to have effected a similar arrangement with the German "Interessen Gemeinschaft,"[1] but the conditions arising from the occupation of the Ruhr by the French are reported to have affected the operation of this agreement. Negotiations have been conducted for some time between the British Dyestuffs Corporation and the I. G., although no final agreement had been made up to June, 1924.

In the establishment of branch plants in the new producing countries, the Swiss appear to have been much more successful to date than the Germans. Three large Swiss manufacturers now operate, either collectively or individually, plants in the United States, Great Britain, Italy, and France. It has been reported that the Swiss and the German dye makers have concluded a working agreement. The German industry has certain advantages over the industries of the new producing countries, including cumulative experience, unified organization for buying and selling, and lower manufacturing costs. The high post-war price levels of dyes exported from Germany would appear to indicate a strong probability of price reductions during the next few years. The commercial warfare which is likely to follow may involve the utilization of such methods as full-line forcing and dumping, such as were practiced by the German chemical industry prior to the war. The

[1] This body is universally known as "I. G.," and will be so referred to throughout the remainder of this report.

retention of a tariff and other protective measures by the new producing countries will doubtless lead the German industry to form affiliations or to establish branch plants in those countries along the lines successfully followed by the Swiss manufacturers. In the case of tariff reductions in the new producing countries, it seems likely that Germany will attempt to recover these markets, and at the same time retain the domestic centralization of dye production. The war made clear the relationship of the coal-tar dye industry to the production of munitions, war gases, medicinals and other essential products, and demonstrated the desirability of home dye production as a means to prevent shortage in times of war. This will probably result in an effort by the large industrial nations to retain dye industries of sufficient size to meet peace requirements and to provide for war emergencies. Reduced production costs and constructive research will be vital factors in the maintenance of their competitive place in the world's trade.

The occupation of the Ruhr in 1923 resulted in a reduced production of dyes in Germany. The total output in 1923 was about 145,000,000 pounds, as compared with 193,000,000 pounds in 1922. This stimulated the export trade of the United States and Great Britain to meet the requirements of China, India, and other consuming nations, nonmanufacturers of dyes. The effects of the occupation had largely disappeared in the early part of 1924 and German dyes were again offered in sharp competition in the markets of the Far East. In the spring of 1923 the French and Belgian authorities seized about 6,500 tons of dyes, a large part consisting of indigo and alizarin red. The British Alizarin Co. purchased a large quantity of alizarin in order to prevent the demoralization of prices by the dumping of this dye on the market, and nearly 1,500,000 pounds of alizarin were imported into the United Kingdom in January, 1924.

PART II

PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1923

PART II

ODUCTION OF DYES AND COAL-TAR CHEMICALS, 1923

COAL-TAR CRUDES

ecord output of by-product coke.—The preliminary figures for the estic production of coke in 1923, as reported by the United States logical Survey, show a total of 55,565,000 tons, an amount almost al to that of 1917 and only 1.6 per cent less than the record set in war year 1918. A new record in the output of by-product coke established in 1923, the year's output of 37,604,743 net tons being increase of 6,770,792 tons over the 1920 output, hitherto the imum.

ince November, 1918, when the production of coke from by-duct ovens passed the production of beehive ovens, the by-product e has been continuously in the lead. In 1923, 67.7 per cent of the l was contributed by by-product ovens and 32.3 per cent by hive ovens. These figures are especially significant when it is embered that the year was one of heavy consumption and favor- prices, conditions which should call forth maximum activity in beehive industry under the present ratio of capacity to demand.

LE 2.—*Production of beehive and by-product coke in the United States, 1913–1923*

Year	Net tons produced			Per cent of total output	
	Beehive	By-product	Total	Beehive	By-product
	33, 584, 830	12, 714, 700	46, 299, 530	72. 5	27. 5
	27, 508, 255	14, 072, 895	41, 581, 150	66. 2	33. 8
	33, 167, 548	22, 439, 280	55, 606, 828	59. 6	40. 4
	30, 480, 792	25, 997, 580	56, 478, 372	54. 0	46. 0
	19, 042, 936	25, 137, 621	44, 180, 557	43. 1	56. 9
	20, 511, 092	30, 833, 951	51, 345, 043	40. 0	60. 0
	5, 538, 042	19, 749, 580	25, 287, 622	21. 9	78. 1
	8, 573, 467	28, 550, 545	37, 124, 012	23. 1	76. 9
	17, 960, 000	37, 604, 743	55, 565, 000	32. 3	67. 7

he recovery in coke production was associated with great activity he iron industry and with a shortage of household fuel. As stated he census of 1921, the replacement of beehive ovens by the by-duct variety, which recovers the tar, ammonia, and gas products rely wasted by the old beehive type, is for the following reasons reat economic significance in the conservation of national re-ces: (1) The by-product ovens increase production of am-ium compounds for fertilizer and other uses; (2) the gas pro-ed in these ovens is used for municipal lighting and industrial ting; and (3) the output of tar insures an abundant supply of coal for the preparation of crudes serving as a basis of the domestic -tar dye and chemical industry.

Production of tars.—The output of coal tar in 1923 was about 440,000,000 gallons, compared with 328,000,000 gallons in 1922. According to the preliminary figures sales of coal tar during 1923 were about 211,000,000 gallons, valued at $9,200,000. The domestic supply of tar is far in excess of the requirements of the domestic coal-tar chemical industry. Of the total production during 1923, 48 per cent was sold and 52 per cent consumed, largely as boiler fuel, in metallurgical plants. This indicates that about one-half of the total production of tar is used as a fuel. That a similar condition existed in 1921 and 1922, is indicated by the production and disposition of coke-oven tar in the United States during the years 1918–1923, as given in Table 4.

In times of fuel shortage the value of tar as fuel increases; in any case, the tar distiller must pay somewhat more than the fuel value of the tar. Of the total tar sold by the coke-oven operators only part is distilled into refined benzene, toluene, naphthalene, and anthracene; this is accounted for by the demand for such partly refined products as motor fuel, solvents, and soft pitches.

TABLE 3.—*Production and sales of coke-oven, coal-gas, water-gas, and oil-gas tar in the United States, 1918–1923*

[Compiled by the United States Geological Survey from reports of producers. The difference between production and sales is accounted for by tar used by the producer, and by changes in stock]

	Coke-oven tar	Coal-gas tar	Total coal tar	Water and oil-gas tar
Production (gallons):				
1918	263, 299, 470	52, 694, 826	315, 994, 296	100, 983, 158
1919	288, 901, 739	(1)	340, 900, 000	(2)
1920	360, 664, 124	51, 264, 956	411, 929, 080	116, 071, 967
1921	253, 051, 649	(1)	303, 000, 000	(2)
1922	327, 779, 734	48, 082, 228	375, 861, 962	104, 592, 029
1923 [3]	440, 389, 905	(1)	488, 389, 905	(2)
Sales (gallons):				
1918	200, 233, 002	47, 727, 839	247, 960, 841	55, 283, 464
1919	217, 707, 157	(1)	264, 900, 000	(2)
1920	174, 363, 696	46, 604, 133	220, 967, 829	39, 238, 738
1921	135, 293, 047	(1)	179, 200, 000	(2)
1922	162, 204, 417	41, 266, 074	203, 470, 491	47, 338, 463
1923 [3]	210, 746, 216	(1)	251, 946, 216	(2)
Value of sales:				
1918	$6, 364, 972	$1, 863, 380	$8, 228, 352	$1, 805, 864
1919	6, 918, 549	(1)	8, 800, 000	(2)
1920	6, 378, 040	2, 010, 186	8, 388, 226	2, 105, 388
1921	5, 645, 309	(1)	7, 760, 000	(2)
1922	6, 419, 743	1, 955, 950	8, 375, 693	1, 879, 690
1923 [3]	9, 225, 925	(1)	11, 203, 925	(2)

[1] No report. Estimate included in total.
[2] No report.
[3] Preliminary figures, subject to revision.

TABLE 4.—*Production and disposition of coke-oven tar in the United States, 1918–1923*

[Compiled by United States Geological Survey from reports of operators]

Year	Coke-oven tar		
	Gallons produced	Per cent sold [1]	Per cent used [1]
1918	263, 299, 470	76. 0	24. 0
1919	288, 901, 739	75. 4	24. 6
1920	360, 664, 124	48. 3	51. 7
1921	253, 051, 649	53. 5	46. 5
1922	327, 779, 734	49. 5	50. 5
1923 [2]	440, 389, 905	47. 9	52. 1

[1] No account is here taken of changes in stocks. [2] Preliminary figures, subject to revision.

Total commercial production of crudes.—The data on domestic production of crudes are collected either by the Tariff Commission or by the Geological Survey, according to the producer. Crudes distilled from tar at the by-product coke-oven plants are reported to the Geological Survey and the output by firms primarily engaged in the distillation of tar is reported to the Tariff Commission. For the first time, the total commercial production of benzene, "motor benzol," toluene, solvent naphtha, and naphthalene from all sources has been combined into a single compilation. This covers the period 1918–1923 and the production data shown in Table 6. An examination of this table shows that there was, in general, an increase in the output of these items in 1923. The production of "motor benzol" and naphthalene recorded notable increases over the figures for 1922.

The production of by-products obtained from coke-oven operations for the years 1921–1923, together with quantity and value of the sales, is given in Table 5. The production of crudes by firms engaged primarily in the distillation of coal tar is shown in Table 7. Noteworthy increases in the 1923 production are shown for naphthalene, cresylic acid, dead oil, anthracene oil, and other distillates.

TABLE 5.—*By-products obtained from coke-oven operations, 1921–1923*
[United States Geological Survey]

Product	Production	Sales		
		Quantity	Value	
			Total	Average
1921				
Tar.....gallons..	253,051,649	135,293,047	$5,645,309	$0.042
Ammonia:				
Sulphate.....pounds..	528,638,763	530,041,716	13,100,703	.025
Ammonia liquor (NH_3 content).....do....	31,899,398	35,102,561	3,515,416	.100
Other forms (NH_3 content).....do....	191,162	53,993	10,135	.188
Sulphate equivalent of all forms....do....	(657,001,003)	(670,667,932)	16,626,254	.....
Gas:				
Used under boilers, etc.....M cubic feet..	[1] 310,188,713	12,122,777	1,120,087	.092
Used in steel or affiliated plants.....do....		98,352,049	10,593,204	.108
Distributed through city mains.....do....		43,826,172	14,249,961	.325
	[1] 310,188,713	154,300,998	25,963,252	.168
Light oil and derivatives:				
Crude light oil.....gallons..	[2] 76,917,269	2,433,078	240,111	.099
Benzol—				
Crude.....do....	1,494,329	1,536,312	343,463	.224
Refined.....do....	4,912,131	5,302,709	1,268,258	.239
Motor benzol.....do....	48,052,882	50,022,573	8,966,686	.179
Toluol—				
Crude.....do....	26,529	26,529	4,410	.166
Refined.....do....	942,982	808,964	228,968	.283
Solvent naphtha.....do....	3,822,776	2,881,656	510,509	.177
Other miscellaneous products.....do....	590,173	291,635	12,310	.042
	59,841,802	63,303,456	11,574,715	.183
Naphthalene:				
Crude.....pounds..	2,827,756	1,652,466	40,659	.025
Refined.....do....	115,229	331,057	18,676	.056
	2,942,985	1,983,523	59,335	.030
Other products.....	.....	.....	121,813	.....
Value of all by-products sold.....	.....	.....	59,990,678	.....
1922				
Tar.....gallons..	327,779,734	162,204,417	6,419,743	.0396
Ammonia:				
Sulphate.....pounds..	695,543,349	714,752,882	17,818,236	.0249
Ammonia liquor (NH_3 content).....do....	50,036,646	48,523,937	4,559,535	.0940
Other forms (NH_3 content).....do....	693,782	192,549	12,041	.0625
	.....	.....	22,389,812	.....
Sulphate equivalent of all forms....do....	895,465,061	909,618,826	.....	.....

[1] Includes gas wasted and gas used for heating retorts.
[2] Of this amount 75,760,334 gallons were refined on the premises to make the derived products listed.

TABLE 5.—*By-products obtained from coke-oven operations, 1921–1923*—Contd.

Product	Production	Sales		
		Quantity	Value	
			Total	Aver
1922				
Gas:				
Used under boilers, etc.....M cubic feet	[1] 442,671,114	19,123,814	$1,251,325	$0.065
Used in steel or affiliated plants.....do		144,976,000	15,942,446	.110
Distributed through city mains.....do		56,930,253	20,326,648	.357
Sold for industrial use.....do		10,352,921	1,104,096	.106
		231,383,018	38,624,515	.167
Light oil and derivatives:				
Crude light oil.....gallons	[1] 101,437,555	5,138,095	630,708	.123
Benzol—				
Crude.....do	2,666,177	2,665,889	698,427	.262
Refined.....do	10,419,504	9,590,459	2,736,944	.285
Motor benzol.....do	57,025,699	54,030,203	10,491,309	.194
Toluol—				
Crude.....do	38,159	3,938	652	.166
Refined.....do	1,955,119	1,906,122	556,365	.292
Solvent naphtha.....do	2,983,858	2,861,482	538,512	.188
Other light oil products.....do	580,058	212,712	14,949	.070
	75,668,574	77,308,900	15,667,934	.203
Naphthalene:				
Crude.....pounds	6,107,742	3,298,851	32,101	.010
Refined.....do	1,810,972	1,589,084	79,149	.050
	7,918,714	4,887,935	131,252	.027
Other products			154,507	
Value of all by-products sold			83,387,763	
1923 [5]				
Tar.....gallons	440,390,000	210,746,000	9,226,000	.044
Ammonia:				
Sulphate.....pounds	904,463,000	875,163,000	25,595,000	.029
Ammonia liquor [6] (NH_3 content)...do	60,659,000	59,573,000	5,771,000	.097
Sulphate equivalent of all forms.....do	1,147,101,000	1,113,455,000	31,366,000	
Gas:				
Used under boilers, etc.....M cubic feet	[7] 598,412,000	34,382,000	1,813,000	.053
Used in steel or affiliated plants.....do		197,149,000	22,402,000	.114
Distributed through city mains.....do		68,902,000	24,348,000	.353
Sold for industrial use.....do		17,709,000	3,594,000	.203
		318,142,000	52,157,000	.164
Light oil and derivatives:				
Crude light oil.....gallons	135,166,000	8,990,000	941,000	.105
Benzol—				
Crude.....do	16,252,000	16,279,000	3,596,000	.221
Refined.....do				
Motor benzol	77,418,000	77,453,000	12,533,000	.162
Toluol—				
Crude.....do	51,000	6,000	1,000	.167
Refined.....do	2,793,000	2,676,000	765,000	.286
Solvent naphtha.....do	4,413,000	3,727,000	641,000	.172
Other light oil products.....do	441,000	200,000	16,000	.080
	101,368,000	109,331,000	18,493,000	.169
Naphthalene:				
Crude.....pounds	11,541,000	9,698,000	206,000	.021
Refined.....do	1,180,000	1,238,000	68,000	.055
	12,721,000	10,936,000	274,000	.025
Other products			200,000	
Value of all by-products sold			111,716,000	

[1] Includes gas wasted and gas used for heating retorts.
[4] 98,432,100 gallons, including 4,200,000 gallons of purchased oil, was refined on the premises to make the derived products listed.
[5] Preliminary figures, subject to revision.
[6] Includes a small amount of other forms of ammonia.
[7] Includes gas wasted and gas used for heating retorts.

ABLE 6.—*Total commercial production of benzene, toluene, solvent naphtha, and naphthalene from all sources in the United States, 1918–1923*

ata for coke ovens and gas works from reports to United States Geological Survey; for tar refineries and others to United States Tariff Commission]

	By-product coke plants (sales)[1]	Gas works (sales)[1]	Tar refineries and all other establishments (production)	Total commercial production [2]
nzene (all grades except motor benzol):				
Gallons—				
1918	43,441,980	2,177,168	3,015,848	48,634,996
1919 [3]	63,077,463	(4)	1,826,373	[3] 65,403,836
1920	17,230,776	(4)	875,561	18,141,337
1921	6,839,021	(4)	2,171,631	9,045,642
1922	12,256,348	(4)	[5] 774,940	13,071,288
1923	16,279,000	(4)	394,906	16,708,906
Value—				
1918	$11,966,367	$572,950	$994,161	$13,533,478
1919 [3]	11,643,645	(4)	560,547	12,296,192
1920	4,497,823	(4)	287,586	4,794,409
1921	1,611,721	(4)	463,205	2,082,926
1922	3,435,381	(4)	[5] 215,136	3,664,517
1923	3,596,000	(4)	118,505	3,725,505
otor benzol:				
Gallons—				
1918				
1919	Included under benzene above		(6)	(6)
1920	[7] 55,764,265	467,126	(6)	(6)
1921	50,022,573	[8] 350,000	(6)	(6)
1922	54,930,203	(6)	(6)	55,622,482
1923	77,453,000	(4)	(6)	80,637,520
Value—				
1918				
1919	Included under benzene above		(6)	(6)
1920	[7] 12,644,931	112,849	(6)	(6)
1921	8,966,686	[8] 70,000	(6)	(6)
1922	10,491,309	(6)	(6)	10,657,074
1923	12,533,000	(4)	(6)	13,238,871
luene, all grades:				
Gallons—				
1918	8,541,366	3,965,518	1,596,353	14,103,237
1919	1,353,827	(4)	510,957	1,884,784
1920	2,470,364	[8] 2,000	(10)	(10)
1921	836,493	[8] 1,000	(10)	(10)
1922	1,910,060	(10)	(10)	(10)
1923	2,682,000	[8] 2,000	(10)	(10)
Value—				
1918	$12,249,702	$5,597,353	$2,044,890	$20,891,945
1919	355,990	(4)	235,321	596,511
1920	740,722	[8] 300	(10)	(10)
1921	233,378	[8] 270	(10)	(10)
1922	557,015	(10)	(10)	(10)
1923	766,000	[8] 570	(10)	(10)
vent naphtha, crude and refined, including ylene:				
Gallons—				
1918	[11] 3,284,037	1,442,267	[12] 965,458	5,691,762
1919	[12] 3,649,066	(4)	(6)	4,128,747
1920	4,695,464	(4)	(6)	5,384,560
1921	2,881,656	(4)	(6)	3,627,488
1922	2,861,482	(6)	(5) (6)	3,680,811
1923	3,927,000	(4)	(6)	4,568,593
Value—				
1918	[11] $458,689	$191,475	[12] $232,003	$882,167
1919	[12] 557,416	(4)	(6)	672,685
1920	851,048	(4)	(6)	994,205
1921	510,509	(4)	(6)	644,548
1922	538,512	(6)	(5) (6)	773,336
1923	657,000	(4)	(6)	849,614
phthalene, all grades:				
Pounds—				
1918	15,890,447	896,080	40,138,092	56,924,619
1919	6,702,040	(4)	12,612,203	20,114,243
1920	14,448,762	1,760,293	26,393,411	42,602,466
1921	1,983,523	(4)	16,949,464	19,432,987
1922	4,887,935	(4)	19,323,393	25,411,328
1923	10,936,000	(4)	41,453,002	54,189,002

[For footnotes see page 20.]

TABLE 6.—*Total commercial production of benzene, toluene, solvent naphtha, and naphthalene from all souces in the United States, 1918–1923*—Continued.

	By-product coke plants (sales)	Gas works (sales)	Tar refineries and all other establishments (production)	Total commercial production
Naphthalene, all grades—Continued				
Value—				
1918	$650,220	$14,282	$1,281,440	$1,945,951
1919	191,364	(1)	327,201	563,365
1920	487,974	63,449	791,403	1,342,826
1921	59,335	(1)	380,167	482,302
1922	131,252	(1)	352,857	538,210
1923	274,000	(1)	652,148	1,036,150

[1] Sales instead of production are here given to avoid double counting between production of crude and pure grades, and because such of the product as is used in the coke plant or gas works is not available for commercial use.

[2] Totals include estimates for firms not reporting, or actual figures for items that can not be shown separately without disclosing individual returns.

[3] Includes motor benzol and 13,000 gallons of gasoline used in blending.

[4] Reports incomplete. Estimate included in total.

[5] Revised figure, to eliminate duplication through certain plants reporting both to the Tariff Commission and to the Geological Survey.

[6] Data not collected from tar refiners prior to 1922.

[7] Includes 1,333,000 gallons of gasoline used in blending.

[8] Estimate.

[9] Included in total, but can not be shown separately without disclosing individual returns.

[10] A certain quantity of toluene was produced both at gas works and at tar refineries, but the figure can not be given without disclosing individual returns.

[11] Includes 52,847 gallons of xylene, valued at $9,937, and 107,375 gallons of crude heavy solvent, valued at $8,769.

[12] Includes 192,969 gallons of xylene, valued at $67,935.

[13] Includes 23,088 gallons of xylene, valued at $4,563.

TABLE 7.—*Production of coal-tar crudes, 1923, by firms not primarily engaged in the operation of coke-oven plants and gas houses*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers given on page 195. An X indicates that the corresponding product was made by a manufacturer who did not consent to the publication of his name in connection therewith. A blank in the third and fourth columns indicates that there was actual production of the corresponding article, but that the figures can not be published without revealing the output of individual firms.]

Name	Manufacturers' identification numbers according to list on page 195	Unit of quantity	1923		
			Quantity	Value	Value per unit
Total crudes [1]				$25,067,086	
Benzene	16, 21, 49, 152, X, X	Gallons	394,986	118,505	$0.30
Toluene	16, X	do			
Xylene	16	do			
Naphthalene (crude)	8, 15, 16, 34, 49, 53, 97, 114, 134, 152, 158, 167, 181, X.	Pounds	41,453,002	652,148	.016
Anthracene (crude, less than 30 per cent).	158, 167	do			
Carbazole (crude, less than 65 per cent).	158, 185	do			
Cresol or cresylic acid (crude).	13, 16, 42, 49, 114, 158	Gallons			
Pyridine	16, 130	do			
Solvent naphtha	13, 16, 49, 97, 167, X	do	501,754	142,122	.283
Dead or creosote oil	8, 13, 16, 21, 34, 42, 49, 53, 97, 101, 114, 134, 158, 167, 181, 201, X.	do	38,636,974	4,266,785	.110
Anthracene oil	8, 158, 167	do			
Pitch of tar	8, 13, 16, 21, 34, 42, 49, 53, 97, 101, 114, 134, 158, 167, 181, X, X.	Tons	675,628	9,684,547	14.336
Other distillates	8, 16, 34, 42, 49, 101, 114, 158, 181, X, X	Gallons	14,801,569	1,941,495	.131
Refined tar	8, 16, 21, 34, 42, 53, 97, 101, 114, 134, 167, 181, X, X.	Barrels	1,675,213	5,944,085	3.548
Motor fuel	49, 152, X	Gallons			

[1] The instructions sent to manufacturers were as follows: Include under dead or creosote oil only products which may be used for creosoting. Include under other distillates shingle stain oils, disinfectant oils, and flotation oils which do not contain over 5 per cent of phenol. Include under refined tars those tars which are used for road treatment, saturating felt, and for protective coatings. Phenol and all distillates which, on being subjected to distillation, yield in the portion distilling below 190° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate, or which, on being subjected to distillation, yield in the portion distilling below 215° C. a quantity of tar acids equal to or more than 75 per cent of the original distillate, are not to be included here but are to be placed under intermediates.

Imports.—Domestic imports for consumption are given in the Appendix in Part VI of this publication. In general, imports of crudes in 1923 registered an increase over those of 1922. One of the principal reasons for this was the large raw material requirements of the timber preserving and chemical industries. Dead or creosote oil, used largely as a timber preservative, led this group both in quantity and value, with a total of 64,199,636 gallons, valued at $10,071,393. This was approximately a 54 per cent increase over the figures for 1922.

The imports of naphthalene ranked second, totaling 20,992,439 pounds, valued at $575,702, compared with 3,144,332 pounds, valued at $54,029, for 1922. Owing to the demand for this product, imports were large during the first seven months of 1923. The increase in price stimulated production and during the latter part of the year the price receded to the January level. Imports of crude cresylic acid totaled 5,761,011 pounds, with a value of $489,824. Other coal-tar crudes showing an increased importation during 1923 include anthracene (purity less than 30 per cent), 869,780 pounds, valued at $23,925; pyridine, 764,918 pounds, valued at $266,184; and benzene, 701,857 pounds, valued at $21,903.

INTERMEDIATES

DESCRIPTION

This class of coal-tar chemicals does not occur as such in coal tar, but is prepared from the crudes (benzene, toluene, naphthalene, and anthracene) by chemical treatment with sulphuric acid, nitric acid, alkalies, chlorine, or other chemicals. From fewer than 10 coal-tar crudes 200 to 300 intermediates are prepared for use in the production of hundreds of dyes. The various chemical stages in the conversion of crudes to intermediates are (1) nitration, (2) reduction, (3) sulphonation, (4) caustic fusion, (5) chlorination, (6) alkylation, (7) liming, (8) condensation, (9) carboxylation, (10) oxidation, and (11) diazotization.

Intermediates are therefore the raw materials which are converted by complex chemical processes into dyes, medicinals, perfumes, flavors, photographic chemicals, and synthetic resins and tanning materials. They are also used as accelerators in the vulcanization of rubber, as camphor substitutes, in the direct production of dyes on the fiber, and for increasing the fastness of dyed colors, in which case they are known as "developers." After purification, many intermediates are used directly as drugs, perfumes, and flavors.

PRODUCTION

The production of intermediates in the United States in 1923 is given in Table 8 in as great detail as is possible without revealing the output of individual manufacturers. The total output in 1923 was 231,393,871 pounds, compared with 165,048,155 pounds in 1922. Sales in 1923 totaled 83,582,808 pounds, with a value of $18,916,058. The average price of intermediates sold in 1923 was

$0.226, as compared with $0.223 for 1922. Although the average price of the total sales for 1923 and 1922 shows practically no change, there were marked decreases in the average sales prices of certain basic intermediates. As an offset to these declines there were increased quantities of the special and more costly intermediates entering into the production of the faster types of dyes. The average sales price of aniline showed little change, being $0.158 for 1923, as compared with $0.151 for 1922. It is of interest to note, in this connection, that aniline oil was quoted at $0.10⅛ in 1913 and that the invoice value of imports in the fiscal year 1913–14 was $0.071. During the war it was quoted as high as 40 to 50 cents per pound. H acid decreased from $0.73 in 1922 to $0.675 in 1923, while b-naphthol, tech., declined from $0.24 to $0.22. Naphthalene, refined, declined from $0.06 to $0.058 per pound, and anthraquinone (100 per cent), required for the manufacture of synthetic alizarin and anthraquinone vat dyes, receded from $1.34 to $0.947 per pound.

The total number of intermediates reported was 311, of which over 80 were not reported during 1922. Many of these new products comprised intermediates of great complexity, and their production represents notable progress in the dye industry. They are almost entirely required for the manufacture of the fast and special types of colors, in which field the industry made a conspicuous expansion during 1923.

Aniline.—Aniline manufactured from benzene, through the intermediate product nitrobenzene, is the most important of all finished intermediates. It ranked, in 1923, first in value and quantity. Aniline is used in the production of dyes of almost every class, whether the classification be based on the method of application or on the chemical constitution. Three of the leading domestic dyes by quantity of output, namely, Indigo, Direct black EW, and Agalma black 10B, require aniline in their manufacture. The output of aniline in 1923 was 26,671,961 pounds, compared with 21,401,864 pounds in 1922. The largest output was in 1920, when the total was 39,234,186 pounds, valued at $10,923,648.

Naphthalene derivatives.—The most important intermediate derived from naphthalene is b-naphthol. The output in 1923 was 5,741,355 pounds, compared with a production of 3,255,901 pounds in 1922. Sales in 1923 were 4,528,236 pounds, valued at $994,635, or 22 cents per pound, a decrease of 2 cents per pound from that of the previous year.

H acid (1-amino-8-naphthol-3:6-disulphonic acid) ranks second among naphthalene derivatives and is one of the most important intermediates required for the production of direct cotton and acid dyes of the azo class. Production of H acid in 1923 was 3,462,664 pounds, with sales amounting to 1,392,506 pounds, valued at $940,272.

Phthalic anhydride is another intermediate derived from naphthalene. It is essential to the preparation of synthetic anthraquinone, which, in turn, is the intermediate used in the production of synthetic alizarin and the anthraquinone vat dyes, including the indanthrenes and most of the algols. In addition, phthalic anhydride is used in the preparation of fluorescein, the eosine dyes, and the rhodamines.

The domestic production of phthalic anhydride in 1923 established a new record, 2,343,802 pounds, compared with 1,629,182 pounds in 1922.

Fumaric and maleic acid.—In 1923 production was reported for the first time of these two acids by a synthetic process—the direct oxidation of benzene with air in the presence of a catalyst. This is a notable discovery of the domestic chemical industry. These two acids appear to hold considerable promise of application in the chemical and associated industries. Maleic acid may serve as the base for the manufacture of many hitherto rare compounds. It is now converted into malic acid, which is used as a food acidulant. Fumaric acid is used in the textile industry.

Anthraquinone.—The large increase in the production of anthraquinone in 1923 represents one of the significant stages of progress in that year. Anthraquinone is used in the manufacture of certain vat dyes (including indanthrenes and most of the algol dyes, synthetic alizarin, and other alizarin derivatives.) Anthraquinone is produced in the United States by the oxidation of anthracene, the latter being derived from coal tar, and by synthesis from phthalic anhydride and benzene. There has been a marked tendency to increase the proportion of the total domestic output by the synthetic process. The total production of anthraquinone in 1923 was 857,190 pounds, compared with 395,107 pounds in 1922. Approximately one-half of the total 1923 output was produced by the synthetic process, this representing a very large increase in the proportion produced by this process over that of 1922.

Special intermediates register large increase.—An examination of the intermediates used in the preparation of fast and special dyes, these being consumed in relatively small quantities as compared with bulk colors, shows a greatly increased output of these special products in 1923. Among these may be mentioned Chicago acid (1-amino-8-naphthol-2:4-disulphonic acid), J-acid urea, diethyl-m-aminophenol, ethyl benzyl aniline, xylidine, Broenner's acid, 2-chloro-5-toluidine-4-sulphonic acid, J-acid (2-amino-5-naphthol-7-sulphonic acid), pyrazolone, Michler's ketone, benzoyl chloride, and the anthraquinone derivatives.

New intermediates.—In 1923 production of 311 coal-tar intermediates was reported, of which over 80 were new products not reported during the year 1922. These new products comprise for the most part intermediates used in the manufacture of the more complex dyes and other coal-tar products and several used in the vulcanization of rubber. The developments of the year are indicated by the production of these more complex products, presenting many technical problems in their production on a commercial scale. Among these recent additions are included chloropyrazolone, dehydrothio-m-xylidine, dibenzylsulphoxide, dimethyltetra aminodiphenylmethane, ethyl carbazole, fumaric acid, maleic acid, methyl anthraquinone, phenazine, quinaldine, tetraaminoditolylmethane, and several anthraquinone derivatives.

INVESTIGATION OF PHENOL AND CRESYLIC ACID UNDER SECTION 315

Phenol.—An investigation under the provisions of section 315, Title III of the act of 1922, was ordered by the Tariff Commission on May 4, 1923, in response to a request for a decrease in the duty on phenol.

The foreign (Great Britain) and domestic costs investigations were completed during the period from June to November, 1923, and on December 13, 1923, after giving due notice as required by law, the commission ordered a public hearing for January 24, 1924. The hearing was completed on that date and further oral argument was waived. Interested parties were given until March 15, 1924, for the filing of briefs.

The present annual consumption of phenol is estimated to be about 11,000,000 pounds. The production of natural phenol from coal tar is only a fraction of this, and the production from this source in the United States is supplemented by synthetic phenol.

The cost of manufacture of synthetic phenol is higher than that of natural phenol. A comparison of the cost of manufacture of phenol (natural) in England, obtained by the Tariff Commission, with a weighted average of the cost of the domestic natural and synthetic phenol show that if the total English cost is taken as 100 the domestic weighted average is 142.5.

The manufacturer in Great Britain has the advantage of cheaper raw materials (tar acids) than the American manufacturer, and furthermore the percentage of phenols is higher in the British tar than in the American tar.

The lower-cost natural phenol at the time of the investigation supplied a greater part of consumption than the synthetic product. The output of synthetic phenol is increasing and in future will be a factor of increasing importance in supplying requirements.

Large increase in output of phenol: The large output of phenol in 1923 represents one of the notable expansions in the industry during that year. The production for 1923 was 3,310,911 pounds, compared with 1,285,978 pounds in 1922. Total sales during 1923 were 2,180,244 pounds, valued at $589,822 ($0.27 per pound), as against a total sales of 1,266,552 pounds, valued at $268,311, in 1922 ($0.21 per pound).

The Government war stock carry-over of phenol, which amounted to approximately 35,000,000 pounds, was believed to be sufficient for a four years' normal supply based upon pre-war consumption of about 9,000,000 pounds a year. Owing to the increased demand for phenol in the manufacture of synthetic phenolic resins, the war stocks were exhausted sooner than was anticipated.

Several manufacturers started producing synthetic phenol in 1923. One of the large manufacturers of phenolic resins has built a synthetic phenol plant and estimates that its production will be at the rate of 7,000,000 pounds a year by the end of 1924. The Barrett Co. estimates its production of phenol for the year 1924 at from 2,000,000 to 2,500,000 pounds.

The synthetic phenol will probably be a factor of increasing importance in supplying domestic requirements.

Cresylic acid.—On May 4, 1923, the commission ordered an investigation of cresylic acid for the purposes of section 315 of the tariff act of 1922, in response to requests for a decrease in the duty on cresol or cresylic acid.

The foreign and domestic costs investigations were completed during the period from June to November, 1923, and on December 13, 1923, the commission ordered a public hearing for January 24, 1924, which was postponed at that time to February 14, 1924. The hearing was completed on that date and further oral argument was waived. Interested parties were given until March 15, 1924, for the filing of briefs. As a result of the cost investigation conducted by the Tariff Commission, it was found that, taking the domestic cost of manufacture of cresylic acid as 100, the cost of manufacture in the United Kingdom was 50.46 in 1923.

It is difficult accurately to estimate domestic consumption of cresylic acid. In the period from 1917 to 1920, inclusive, when imports were fairly uniform and when there was little domestic production, the total imports indicate an annual consumption of cresylic acid of between 8,000,000 and 10,000,000 pounds. Although the total potential capacity of domestic producers of cresylic acids is estimated at approximately 9,500,000 pounds, domestic production has been about one-half of the maximum capacity.

Taking into consideration the expansion of the consuming industries, it seems likely that the present consumption of cresol and cresylic acid is between 10,000,000 and 12,000,000 pounds per year.

In the manufacture of cresols and cresylic acid from coal-tar distillates as carried on both in the United States and abroad phenol is one of the by-products obtained. The crude tar acids, after removal of the crude phenol fraction, yield various grades of cresols and cresylic acids. In American practice the fractions usually obtained, in their order after the crude phenol fraction, are (1) ortho cresol, (2) meta and para cresol, (3) cresol U. S. P., (4) refined cresylic acid, (5) crude cresylic acid 97–99 per cent straw color, and (6) crude cresylic acid 95 per cent dark. Both in the United Kingdom and in this country the companies consider that the production cost of cresylic acid and the production cost of crude carbolic acid are the same, because they are produced simultaneously in the same plant.

Cresylic acid records large increase in production: As in the case of phenol, the production of cresylic acid registered a notable increase, being about double that of the previous year.

The production of cresylic acid has shown a large increase since the passage of the tariff act of 1922. During recent months the imports of duty-free cresylic acid have increased greatly. These imports comprised in large part a grade of cresylic acid just below the specifications of the dutiable grades of paragraph 27 of the act, a grade which is readily converted into a refined cresylic acid by a simple distillation.

STATISTICS OF PRODUCTION.

TABLE 8.—*Production and sales of coal-tar intermediates, 1923*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 195. An X signifies that the manufacturer did not consent to the publication of his identification number in connection with the designated product. A blank in the third and fourth columns indicates that sales figures can not be published without revealing information in regard to the output of individual firms. A blank in the sixth column indicates that the production of the corresponding product in the United States can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the total]

Name	Manufacturers' identification numbers according to list on page 195	Sales			Total production
		Quantity	Value	Average price per pound	
Total intermediates		*Pounds* 83,582,808	$18,916,058	$0.23	*Pounds* 231,393,671
Acetanilide, tech	7, 80, 122, 128, 166, 167.	249,099	65,306	.26	
Acetyl-p-phenylenediamine (p-amino acetanilide).	6, 7, 63, 82, 88, 131, 167.				133,214
Acetyl-o-toluidine	63				
Acetyl-p-toluidine	39, 63, 167				237,627
Acridine, base	151				
Aldehyde aniline derivatives	X				
b-Amino anthraquinone	63, 137				
Aminoazobenzene	7, 32, 36, 64, 74, 88, 91, 131, 133.				125,270
Aminoazobenzene sulfonic acid	63, 133				
Aminoazobenzene disulfonic acid	131, 133				
Aminoazotoluene	32, 63, 64, 88, 91, 131, 133, 155.				85,262
Aminoazotoluene sulfonic acid	133				
Aminoazotoluene disulfonic acid	63				
Aminoazoxylene	131				
p-Aminobenzoic acid	63, 126, 166				18,241
p-Aminodimethylaniline	85				
Aminodiphenylamine sulfonic acid	202				
1-Amino-2-naphthol-4-sulfonic acid	6, 19, 32, 39, 63, 88, 133, 167, X, X.			.60	702,629
1-Amino-8-naphthol-4-sulfonic acid	39, 63, 131, 137				143,965
1-Amino-8-naphthol-2:4-disulfonic acid (Chicago acid).	39, 63, 131, 137				201,579
1-Amino-8-naphthol-3:6-disulfonic acid (H acid).	25, 63, 88, 125, 131, 137.	1,392,506	940,272	.68	3,462,664
2-Amino-5-naphthol-7-sulfonic acid (J acid).	39, 63, 131, 137, X				143,340
2-Amino-8-naphthol-6-sulfonic acid (gamma acid).	25, 32, 39, 63, 131, 137, X.			1.51	206,405
2-Amino-8-naphthol-3:6-disulfonic acid.	137				
o-Aminophenol	82, 195, 202	14,483	33,812	2.33	
p-Aminophenol and hydrochloride	9, 57, 63, 68, 82, 137, 195, 202.	60,859	68,646	1.13	135,564
o-Aminophenol-p-sulfonic acid	7, 25, 63, 131, 202				93,179
Aminosalicylic acid	6, 39, 52, 63, 88, 131, 137.				62,190
Anhydroformaldehyde aniline	63				
Anhydroformaldehyde p-toluidine	63				
Aniline disulfonic acid	131, X				
Aniline hydrochloride	27, 87, 131	775,571	174,850	.23	600,350
Aniline oil	27, 63, 87, 122, 124, 128, 131, 132.	14,506,027	2,293,639	.16	26,671,961
Aniline sulfate	63, 91, 131, 132, 151	13,279	3,958	.30	
Aniline for red	131				
Anisidine	63, 137, 202	3,717	8,628	2.59	15,419
Anthracene, refined (average content 86 per cent).	8, 63, 185				
Anthranilic acid (o-aminobenzoic acid).	62, 63, 128, 190			1.63	45,313
Anthraquinone 100 per cent	18, 63, 107, 131, 163, 185.			.95	857,190
Anthraquinone-1:5-disulfonic acid	88, 131				
Anthraquinone hydrazine	137				
Anthraquinone-2-sodium sulfonate (silver salt).	18, 63, 131, 137				430,760
Anthrarufin	131				
Benzaldehyde	44, 78, 142, 180, 192, X	227,521	165,431	.73	293,987
Benzanthrone	63, 122, 137				
Benzidine, base	32, 39, 63, 78, 88, 131	202,590	162,775	.80	708,880
Benzidine sulfate and hydrochloride.	3, 88, 131, 137, X				

roduction and sales of coal-tar intermediates, 1923—Continued

	Manufacturers' identification numbers according to list on page 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
.....	44, 95, 166, X	749, 645	$450, 889	$0. 60	749, 985
.....	44, 63, 95, 137, 166			. 59	118, 668
.....	44, 166, X	38, 381	25, 911	. 68	62, 822
.....	142				
.....	131				
.....	17, 95, X				
.....	131, 142, 192				
.....	132				
	62				
e 2-naphthy-					
id.					
erage content	63, 185				
	68				
nol	202				
ıic acid	202				
ıic acid	202				
	131				
	63, 137				
)	62, 95, 107, X	5, 293, 974	390, 940	. 07	7, 024, 604
one	137				
	80, 133				
hraquinone	X				
e	63				
)	202				
iamine	133				
	63				
	131				
onic acid	63				
-sulfonic acid	63, 121, 167, 202				
(*See* 1:8-di-					
e-3:6-disulfo-					
d para	118				
	93				
1 (distillates	13, 16				
C. tar acids					
n 75 per cent					
late.)					
ine sulfonic	19, 70, 80, 137, 147, X				62, 011
ine	137				
e sulfonic acid	133				
lfonic acid	6, 63, 70, 80, 131, 137				129, 625
	39, 63, 131, 137			3. 69	89, 929
	131				
ulfonic acid	32, 39, 88, 131, 133, X				249, 714
	137				
	132				
anthraqui-	137				
ne azine	137				
	62				
	39, 202				
ic acid	151				
	62, 107, X				
	62, 95, 107, 138, X	1, 315, 546	200, 434	. 15	1, 419, 879
zine sulfonic	151				
ydride	56				
ol	63				
	63, 131, 180, 205			. 48	125, 713
c acid	63				
ione sulfonic	190				
sulfonic-2:2-	131, 137, X				
acid urea).					
alene	6, 88				
alene-3:6-di-	125, 131, 137				151, 303
otropic acid).					
	7, 27, 63, 85, 87, 131	1, 502, 265	562, 992	. 38	2, 681, 751
thraquinonyl	63				
tolazine)	131				
liphenylme-	151				
	84, 131				

TABLE 8.—*Production and sales of coal-tar intermediates, 1923*—Continued

Name	Manufacturers' identification numbers according to list on page 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Dinitrobenzanthrone	137				
Dinitrobenzene	27, 63, 131, 195	575,089	$107,258	$0.19	2,961,139
m-Dinitrobenzene	12				
Dinitrochlorobenzene	12, 63, 88, 107, 131	1,039,333	166,277	.16	7,443,67
Dinitrochlorobenzene-p-sulfonic acid.	133				
2:6-Dinitrochlorobenzene-4-sulfonic acid.	202				
Dinitrophenol, and sodium salt	12, 88				
Dinitrosalicylic acid	133				
Dinitrotoluene	12, 63, 64, 81, 91, 131	1,243,945	183,016	.15	4,324,19
Diphenylamine	63				
Diphenylguanidine	12, 61, 63, 131, 149, X	846,431	914,618	1.09	967,87
Diphenylmethane sulfonate	131				
Diphenyl sulfoxide	132				
Distilbenediphenol	131				
Dithiobenzoyldisulfide	132				
o-Ditolylguanidine	63				
Ditolylmethane	131				
p-Ditolylsulfoxide	132				
Ditolylthiourea	X				
o-Ditolylthiourea	63, 85, 132				
Ethyl acetanilide	131				
Ethyl-p-aminoacetanilide	131				
Ethyl-p-amino benzoate	126				
Ethylaniline (mono)	36, 63, 131, 205				
Ethylbenzylaniline	36, 63, 131, 180, 205			1.14	213,89
Ethylbenzylaniline disulfonic acid	36, 63				
Ethylbenzylaniline sulfonic acid	36, 80, 131				
Ethyl carbazole	63				
Ethylidene aniline	132				
m-Ethoxyphenyl-p-toluidine	X				
Fluorescein	7, 56, 63, 91				61,69
Formaldehyde-p-amino aniline	85				
Formanilide	63, 132, 167, X				
Fumaric acid	131				
Gamma acid. (*See* 2-amino-8-naphthol-6-sulfonic acid.)					
H acid. (*See* 1-amino-8-naphthol-3:6-disulfonic acid.)					
Heptylidene aniline	132				
b-Hydroxy naphthoic acid	39, 63				
b-Hydroxy naphthoic anilide (naphthol AS).	63, 131				
p-Hydroxy phenyl arsonic acid and sodium salt.	108, 120				
m-Hydroxy phenyl-o-toluidine	X				
Indanthrene RS	137				
Indophenol	X				
Isodibenzanthrone	137				
J acid. (*See* 2-amino-5-naphthol-7-sulfonic acid.)					
Laurent's acid. (*See* 1-naphthylamine-5-sulfonic acid.)					
Lead dithiobenzoate	X				
Maleic acid	131				
dl-Malic acid	131				
Mercaptobenzothiazol and derivatives.	X				
Metanilic acid	6, 39, 63, 64, 88, 91, 131, 133.				611,751
Methylaniline (mono)	205				
Methylaniline sulfonic acid	X				
Methyl anthraquinone	163, X				
4:4-Methyl diphenylsulfone	132				
Methyl ester of p-tolyl sulfonic acid.	131				
Methylene dianilide	63				
Methylene p-toluidine	137, X				
Michler's hydrol. (*See* Tetramethyldiamino benzhydrol.)					
Michler's ketone. (*See* Tetramethyldiamino benzophenone.)					
Naphthalene, solidifying 79° C. or above (refined, flake).	13, 16, 27, 34, 35, 114, 137, 182, 201, X.	21,871,196	1,270,722	.06	28,184,794
1:5-Naphthalene disulfonic acid	63, 131, 137				66,382
2:7-Naphthalene disulfonic acid	63, 167				

3.—*Production and sales of coal-tar intermediates, 1923*—Continued

Name	Manufacturers' identification numbers according to list on page 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
ene trisulfonic acid	167				
lfone-3-sulfonic acid	137				
	7, 32, 39, 91, 96, 131, 171, 184.	57,274	$35,674	$0.62	233,578
ch	27, 32, 39, 91, 167, 171	4,528,236	994,635	.22	5,741,355
.S.P.	27				
hloro-3:6-disulfonic H acid).	131				
ulfonic acid (Nevile acid).	7, 32, 52, 63, 88, 131, 137.				285,317
ulfonic acid	6, 39, 63, 88, 125, 131, 133, 137.				166,191
-disulfonic acid	167				
-disulfonic acid	63				
:8-trisulfonic acid	32, 131, 137				
ulfonic acid	63				
ulfonic acid (Schaef-	6, 32, 39, 63, 64, 88, 131, 137, X.				146,755
ulfonic acid	39, 63, 167				
ulfonic acid	63, X				
-disulfonic acid	3, 25, 27, 32, 39, 63, 88, 131, 137, 167, 190, 198, X.	150,149	75,911	.51	613,777
-disulfonic acid	25, 27, 32, 39, 131, X				
sultam - 2:4 - disul-	63				
sulton - 8 - sulfonic	39				
ine	16, 63, 137	862,518	260,218	.30	
ine	6, 39, 63, 131			.75	505,819
ine-4-sulfonic acid acid).	7, 32, 39, 52, 63, 91, 131, 137, X	121,694	49,054	.40	1,491,963
ine-5-sulfonic acid id).	6, 32, 63, 88, 91, 131, 133, X				277,288
ine-6-sulfonic acid	131				
ine-6 and 7-sulfonic	39, 131, 137, X				341,295
ine-8-sulfonic acid	6, 63, 131, 133				
ine-3:6-disulfonic 's acid).	6				
ine-3:8-disulfonic	39, 63, 137				55,577
ine-4:8-disulfonic	39, 63, 131, 137				595,493
ine-3:6:8-trisulfonic	63, 131, 137				3,524,246
ine-1-sulfonic acid	28, 39, 66, 167	169,018	159,567	.94	281,738
ine-6-sulfonic acid cid).	6, 39, 63, 131				28,884
ine-4:8-disulfonic	39, 63, 137				
ine-5:7-disulfonic	39, 63, 131, 137, X				247,501
ine-6:8-disulfonic	32, 39, 63, 131, 137, X				552,010
ne-3:6:8-trisulfonic	137				
her's acid. (*See* 1-ilfonic acid.)					
ide	25, 39, 63, 167				104,496
nol	64, 88, 133				25,138
cyclic acid	133				
	63, 195				
	7, 25, 166, 167, X	1,530,837	1,054,881	.69	2,008,003
>-sulfonic acid	63, 80, 88, 167, 202	8,217	8,203	1.00	22,260
>-sulfonic acid	202				
	63, 137				
line	63				
cid	126				
oil of mirbane)	27, 63, 87, 131, 132, 137.	2,523,592	261,780	.10	45,066,881
acid	1, 63, 166				40,162
loride	X				
zene	63				
nzene	63, 128				
nzene	63, 128				

TABLE 8.—*Production and sales of coal-tar intermediates, 1923*—Continued

Name	Manufacturers' identification numbers according to list on page 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
o-Nitrochlorobenzene-p-sulfonic acid	133, 202				
p-Nitrochlorobenzene-o-sulfonic acid	131, 202				
8-Nitro-1-diazo-2-naphthol-4-sulfonic acid	39, 63				
o-Nitro-p-dichlorobenzene	202				
3-Nitro-4-hydroxyphenyl arsonic acid	108, 120, 126				
Nitronaphthalene	16, 63, 137				
o-Nitrophenol	195, 202				
p-Nitrophenol	46, 63, 128, 137, 195, 202				
Nitroso-b-naphthol	X				
Nitrosodimethylaniline and hydrochloride	27, 46, 63, 88, 107, 131, 132, 137, 204, 205, X	23, 279	$27, 327	$1.17	
Nitrosophenol	6, 9, 12, 18, 68, 88, 131, X, X				
Nitrosulfoanthrarufin	131				
Nitrotoluene	63, 64, 81, 91, 131, 137				
o-Nitrotoluene	12, 63, 81, 131, 137, X				
m-Nitrotoluene	12, 63				
p-Nitrotoluene	12, 63, 81, 131, 137, X	220, 784	112, 682	.51	
o-Nitrotoluene sulfonic acid	80				
p-Nitrotoluene-o-sulfonic acid	6, 39, 63, 80, 131, 137, 202				
m-Nitro-p-toluidine	39, 63, 167	158, 350	317, 308	2.00	
p-Nitro-o-toluidine	39, 63, 131, 190				
Nitroxylene	27, 39, 63, 131, 137				
Oxalyl arsanilic acid	126				
Oxalyl-p-nitroaniline	63				
Oxalyl-m-phenylenediamine	63				
Oxalyl-p-phenylenediamine	63				
Phenazine	107				
Phenol	16, 62, 93, 118, 128, 148, 171, X	2, 180, 244	399, 822	.27	
Phenylglycine, and sodium salt	62, 63, 131				
Phenylhydrazine, base and hydrochloride	179				
Phenyl hydrazine-o-sulfonic acid	88				
Phenyl hydrazine-p-sulfonic acid	27, 63, 131, 183				
Phenyl-1: 8-dihydroxnaphthalene-disulfonic acid (phenyl I acid)	131				
Phenyl-a-naphthylamine	63				
Phenyl-1-naphthylamine-3-sulfonic acid	6, 63, 88, 131, 133				
Phenylmethylpyrazolone	63				
Phenyl pyrazolone	133				
Phenyl rosinduline	63				
Phenyl sulfide	132				
Phenyl thiourea	132				
m-Phenylenediamine	6, 27, 32, 39, 52, 63, 88, 91, 131, 137, 140, 195, X				
m-Phenylenediamine sulfonic acid	X				
p-Phenylenediamine	74, 82, 167, X	282, 204	372, 124	1.32	
Phthalamide	128, 190				
Phthalic acid and anhydride	63, 128, 131, X	2, 091, 100	596, 508	.29	
Picramic acid	25, 27, 131, X				
Primuline, base	19, 63, 80, 131, 147				
Pyrazolone	133, 151				
Quinaldine	26, 131				
Resorcinol, tech	148, X				
Resorcinol, U.S.P	148, X				
Salicylic acid, tech	62, 63, 93, 124, 128, X			.31	
Salicylic acid, U.S.P	93, 124, 128, X	1, 244, 028	393, 343	.32	
Sulfanilic acid	27, 32, 39, 63, 87, 88, 91, 118, 131, 151, 183, 195	186, 480	31, 104	.17	
Sulfoanilide	133				
o-Sulfobenzoic acid	99				
o-Sulfobenzoic acid, ammonium salt	99				
o-Sulfobenzoic acid, chloride of	99				
Tetraaminoditolylmethane	63				
Tetrachlorophthalic anhydride	56				

LE 8.—*Production and sales of coal-tar intermediates, 1923*—Continued

Name	Manufacturers' identification numbers according to list on page 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
yldiaminobenzhydrol ydrol).	131				
yldiaminodiphenylme- ethylmethane).	131				
hyldiaminobenzhydrol r's hydrol).	63, 80				
thyldiaminobenzophe- (lichler's ketone).	63				
hyldiaminodiphenylme-	63, 80, 88, 131				
hylthiouramdisulfide	132				
ne	6				
anilide	12, 85, 131, 132, X, X.	2, 113, 059	$517, 748	$0. 25	3, 309, 414
and salts	39, 63, 131, 137				166, 121
disulfonic acid	X				
sulfamide	X				
sulfamide	X				
sulfochloride	128				
alfonyl ethyl ester	131				
	63, 81, 131				
ne	12, 39, 63, 81, 131, 137, X.	807, 795	107, 936	.13	1, 440, 884
ne	12, 39, 63, 81, 131, 137, 202, X.	293, 212	253, 399	.86	1, 060, 848
sulfonic acid	39, 63, 88, 91, 133, 202				101, 348
-benzoic acid	137				
nediamine	6, 12, 32, 39, 52, 63, 64, 88, 91, 107, 131, 137, X.	351, 172	326, 326	.93	1, 179, 457
ediamine	12				
liamine, meta and para	137				
nediamine sulfate	131				
nediamine sulfonic acid	131				
loures	132				
aphthylamine-8-sulfonic lyl-peri acid).	131				
phenol	62				
fluorescein	63				
phosphate	31				
guanidine	131, 132				
and salt	27, 39, 63, 131, 137	168, 752	72, 726	.43	363, 029
ne acetate	131				
thyl dithiocarbamate	132				
obenzoate	X				
intermediates	137				

8A.—*Production of intermediates, by groups, according to unit values, 1921, 1922, and 1923*

Group	1923		1922		1921	
	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total
	104, 419, 258	45. 127	94, 688, 278	57. 372	28, 682, 310	40. 455
s	50, 233, 638	21. 709	26, 233, 604	15. 894	16, 986, 701	23. 959
s	42, 556, 640	18. 391	24, 399, 085	14. 783	11, 457, 747	16. 160
s	16, 486, 159	7. 125	8, 289, 387	5. 022	4, 329, 047	6. 106
	9, 664, 153	4. 176	5, 918, 904	3. 586	4, 689, 343	6. 614
l	5, 587, 436	2. 415	3, 957, 355	2. 398	2, 517, 764	3. 551
	914, 837	.395	568, 339	.344	1, 204, 584	1. 699
	951, 521	.411	721, 637	.437	731, 758	1. 032
	136, 302	.059	197, 071	.119	110, 316	.156
	443, 927	.192	74, 495	.045	190, 348	.268
al	231, 393, 871	100. 00	165, 048, 155	100. 00	70, 899, 912	100. 00

Dyes and Other Finished Coal-Tar Products

INTRODUCTORY

Finished coal-tar products are divided into the following eight classes: (1) Dyes, (2) color lakes, (3) photographic chemicals (developers), (4) medicinals, (5) flavors, (6) perfume materials, (7) synthetic phenolic resins, (8) synthetic tanning materials. In previous reports the Tariff Commission has emphasized the close relationship existing between the manufacture of explosives, poisonous gases, and dyes, also the fact that many explosive plants since the signing of the armistice have been converted into dye factories. During the war the dye plants of Germany supplied the army of that country with poisonous gases and explosives. The dye industry is also closely connected with the manufacture of flavors, perfume materials, photographic chemicals, medicinals, and other coal-tar products, which, although produced in smaller quantities than dyes, use as raw materials many of the by-products obtained in the manufacture of coal-tar dyes.

The production of dyes and other finished products in 1923 is shown in Table 12 in as great detail as is possible without revealing the output of individual manufacturers.

The total production of dyes and other finished coal-tar chemicals in 1923, by 164 firms, was 122,950,171 pounds, compared with a 1922 production, by 164 firms, of 88,368,131 pounds. Total sales in 1923 amounted to 115,297,586 pounds, with a value of $65,898,177. Production during 1923 represented a 39 per cent increase in quantity compared with that of 1922.

SUMMARY OF DYE PRODUCTION IN 1923

Large increase in output.—The output of dyes by 88 firms was 93,667,524 pounds, compared with 64,632,187 pounds in 1922. Sales for the year 1923 totaled 86,567,446 pounds, with a value of $47,223,161. In this connection it is of interest to compare the size of the industry in 1923 with that existing prior to the war, the output in 1914, by 7 firms, being 6,619,729 pounds, with a value of $2,470,096. This production was almost entirely from imported intermediates, chiefly from Germany.

Among the more important factors responsible for the large output of dyes in 1923 may be included (1) the activity of the domestic textile and dye-consuming industries, (2) the occupation of the Ruhr, which caused a reduction in the output of the German dye factories and consequently enabled the domestic producers to increase their exports to Far East markets, (3) the relatively high foreign price levels of dyes compared with those of the pre-war period, and (4) the effect of the tariff act of 1922, giving special protection to coal-tar products.

In contrast with other ad valorem rates in that act, the rates under paragraphs 27 and 28, on imported coal-tar products competitive with the same or similar domestic products, are assessed on the American selling price of the domestic articles. As against this, products noncompetitive with domestic products are assessed on the "United States value," being the selling price of the imported dyes in the domestic markets. In determining the dutiable value, cer-

ain statutory deductions are made from the selling price to cover ransportation, duty, importer's expenses, and profits.

Another new feature was the basing of the specific duty on dyes pon standards of strength in ordinary commercial use.

Further price reduction in dyes.—The average selling price of dyes during 1923 was $0.545 per pound, compared with $0.60 in 1922 and $1.26 in 1917. The 1923 selling price is a 10 per cent decline from hat of 1922.

The average selling price of Indigo, which led in quantity of production, was $0.23 for 1923 as against $0.24 for 1922. The average price of Sulphur black for 1923 was $0.20 compared with $0.21 for 922. This dye was second in quantity of production. The third lye—Direct deep black EW—showed little change; the average price for 1923 was $0.428 compared with $0.42 in 1922. In the case f Agalma black 10B, the average price receded from $0.79 in 1922 o $0.71 in 1923. Reductions were also recorded in the average rices of many of the so-called special colors, which do not comprise large proportion of the total output, as is shown in the following able.

Table 9 presents a comparison of the domestic sales prices of 100 lyes for the years 1917–1923, together with the invoice prices of the ame dyes imported during the year 1914. The colors for which tatistics are given in this table represent about 90 per cent of the omestic production. It should be noted that the domestic sales rice is not directly comparable with the invoice prices in 1914. Invoice prices do not represent the cost to the consumer, as they do not include the importer's profit, or, in most cases, "charges for containers and packing, freight, and insurance to seaport, consular certification, minor shipping charges at point of departure and at seaport."

The Schultz number as indicated in column 1 is that of "Farbstoff-Tabellen" (Dyestuff Tables), by Gustav Schultz, 1914 edition. Column 2 gives the common name of the dye as adopted by the Tariff Commission for designating all dyes reported under a given Schultz number (column 1). The invoice price (1914), shown in column 3, represents the weighted average of all dyes classified under a given Schultz number in "Artificial Dyestuffs Used in the United States," Department of Commerce, Special Agents Series No. 121. This weighted average price for all types is usually higher than the invoice price per pound for dyes representing the bulk of the importation under a given Schultz number. The individual dyes imported under given Schultz numbers in the Norton Census show a wide variation in price, frequently amounting to several hundred per cent. This is due chiefly to the great divergence in concentration of the different dyes and also to the variation in prices of special and pure brands, which are more costly than the ordinary brands. Column 4 gives the domestic sales price as reported to the Tariff Commission, representing the weighted average price of all manufacturers for the dyes reported under a given Schultz number. Most of these prices were published in the "Census of Dyes and Coal-Tar Chemicals, for the years 1917–1922."

TABLE 9.—*Domestic sales prices of 100 dyes, 1917–1923, compared with invoice values of the same dyes imported, 1914*

Schultz No.	Name	1914 invoice value imported dyes (weighted average of all types)	Average price per pound						
			1917	1918	1919	1920	1921	1922	1923
9	Direct yellow R	$0.178	$2.55	$2.61	$1.74	$1.49	$1.07	$0.88	$0.8
10	Stilbene yellow	.162				1.53	1.22		1.0
11	Chloramine orange G	.239	3.32	2.86	1.99	1.88	1.60	1.32	1.2
23	Tartrazine	.200	1.50	1.91	2.04	1.86	1.80	1.08	.8
33	Chrysoidine Y	.136	1.09	.77	1.04	.87	.77	.63	.5
34	Chrysoidine R	.165	1.22	1.22	1.12	.79	.75	.63	.5
37	Croceine orange	.133	1.13	.89	.88	1.04	.86	.77	.5
38	Orange G	.148	1.25	.92	1.04	1.22	.96	.68	.5
42	Amido naphthol red G	.150	3.04	1.16	.97	1.78	1.46	.83	.7
48	Alizarin yellow G	.077	.59	.68	.72	.63	.53	.39	.3
58	Alizarin yellow R	.154	.83	.91	.84	.86	.69	.61	.5
66	Amido naphthol red 6 B	.604		.88	.81	1.51	1.25	.66	.7
82	Ponceau 2 R	.095	1.15	.79	.80	.80	.73	.61	.5
112	Bordeaux B	.159	1.46	1.02	.91	.93	.84	.75	.7
119	Diamine rose	.411		5.50	5.15	5.33	3.89	3.01	2.4
134	Metanil yellow	.164	2.24	1.61	1.65	1.64	1.20	.92	.9
137	Acid yellow G	.176	1.32	.85		.43	1.04	1.03	.9
141	Azo yellow	.249	2.04	2.02	1.95	2.08	1.83	1.39	1.1
145	Orange II	.061	.98	.68	.63	.62	.51	.38	.3
154	Palatine chrome brown	.256	1.90	2.00	1.68	1.55	1.53	1.34	1.0
157	Diamond black P. V	.130				1.65	1.25		
161	Fast red A	.118	1.19	1.03	1.05	1.04	.96	.83	.7
163	Azo rubine	.198	2.71	1.51	1.43	1.43	1.26	.92	.6
164	Fast red V. R	.188	2.25	1.25	2.20	2.28	1.96	1.59	1.2
168	Amaranth	.138	1.31	.88	2.98	2.11	3.23	.86	.7
169	Cochineal red	.127	1.44	1.16	1.32	1.26	.99	.76	.7
173	Lithol red R	.083	1.25	2.38	.39	1.82	1.63	1.25	1.1
177	Mordant yellow	.149	.74	1.35	1.89	.81	.98	.76	.6
181	Salicine black U	.156	2.92	1.62	1.25	1.10	.75	.55	.3
188	Sulphon acid blue R	.252	2.25	2.25	2.02	1.95	1.67	.91	.6
217	Agalma black 10 B	.134	1.08	1.26	1.47	1.29	1.09	.79	.7
227	Brilliant croceine	.165	1.35	1.92	2.41	2.23	1.56	1.09	
236	Wool red B	.143	2.50	2.10	2.67	2.64	1.41	1.02	1.1
257	Sulphon cyanine G	.166	2.25	2.25	2.21	2.36	1.74	1.21	.9
265	Sulphon cyanine black	.110	2.25	2.10	1.91	1.80	1.48	1.14	
266	Naphthylamine black D	.144	1.89	.84	1.01	.87	.94	.66	.5
275	Diamond black	.172	2.50	1.40	1.48	1.55	1.25	.94	.6
283	Bismark brown	.186	1.17	.81	1.01	.84	.78	.56	.4
284	Bismark brown 2 R	.183	1.48	.97	1.04	.91	.83	.63	.3
304	Chrysophenine G	.270	12.64	5.71	2.53	2.81	2.03	1.79	1.4
307	Congo red	.179	2.47	2.01	1.12	.86	.89	.65	.3
327	Diamine violet N	.255			3.32	2.97	2.17	1.44	1.1
333	Oxamine black B H N	.133	2.50	3.25	2.72	2.49	1.48	.91	.7
337	Benzo blue 2 B	.041	2.00	1.37	1.00	.88	.69	.48	.4
340	Benzo orange R	.231	2.00	1.56	.88	1.07	.86	.59	.4
342	Chrysamine G	.189	1.97	1.53	1.36	1.08	.99	.93	1.1
343	Diamine fast red F	.362			2.72	2.59	2.09	1.39	1.1
344	Diamine brown	.194		2.60	2.20	1.99	1.65	1.19	.9
363	Benzo purpurine 4 B	.133	2.82	2.46	1.80	1.46	1.20	.90	.6
391	Benzo blue 3 B	.209	2.32	2.23	1.69	1.67	1.03	.78	.5
405	Benzo purpurine 10 B	.234		4.73	2.07	2.47	2.33	1.64	1.4
410	Benzazurine G	.267		3.00	3.18	1.98	1.53	1.28	
419	Chicago blue R W	.222			2.40	1.88	1.67	1.45	1.1
424	Chicago blue 6 B	.275			3.08	2.11	1.90	1.52	1.4
426	Benzamine pure blue	.440	5.00	4.40	1.97	2.43	1.39	1.23	.9
462	Direct deep black E W	.144	.75	.85	1.04	1.03	.79	.42	.3
463	Erie direct black R X	.139			1.04	.99	.71	.61	.5
474	Oxamine green B	.174	2.30	2.20	1.85	1.51	1.21	.92	.6
475	Oxamine green G	.230	2.16	2.09	2.14	1.20	1.03	.98	.9
476	Benzamine brown 3 G O		1.80	1.70	1.65	1.60	1.15	.73	.5
477	Congo brown G	.194	2.00	2.25	1.83	1.58	1.45	.98	.5
485	Benzo brown G	.170	1.80	1.50	1.23	1.39	1.06	.90	.7
493	Auramine	.240	3.08	3.76	3.08	2.48	2.02	1.66	1.2
495	Malachite green	.241	6.28	5.60	3.26	3.32	1.97	1.22	1.0
499	Brilliant green	.221		5.63	4.66	4.23	3.08		
502	Guinea green	.255	8.50	8.10	5.12	5.22	3.94	1.77	1.2
512	Magenta	.294	9.10	7.72	4.57	4.67	3.28	2.26	2.3
515	Methyl violet	.248	3.84	2.78	2.44	2.39	1.89	1.25	1.2
521	Aniline blue	.368	4.85	5.56	4.86	6.32	2.91	4.36	
530	Acid violet	.281	8.50	7.00	4.93	5.20	3.64	1.88	1.4
536	Alkali blue	.409	4.71	8.33	6.35	5.90	3.42	2.42	2.3
543	Patent blue	.305	10.78	8.68					
559	Victoria blue B	.312	11.91	8.46	3.65	5.14	3.86		

TABLE 9.—*Domestic sales prices of 100 dyes, 1917–1923, compared with invoice values of the same dyes imported, 1914*—Continued

Schultz No.	Name	1914 invoice value imported dyes (weighted average of all types)	Average price per pound						
			1917	1918	1919	1920	1921	1922	1923
566	Wool green S	$0.353	$6.98	.....	$5.95	$4.99	$1.88	$1.10	$0.83
573	Rhodamine B	.415	10.00	$15.92	6.90	6.72	.....	.....	.....
587	Eosine	.418	8.58	7.81	6.30	4.19	2.51	1.90	1.84
606	Phosphine	.352	6.00	6.00	3.86	4.17	3.70	2.05	1.93
616	Primuline	.144	4.43	3.04	1.71	1.59	1.37	1.07	.70
617	Columbia yellow	.136	3.00	3.56	2.66	2.36	1.59	1.29	1.17
626	Gallocyanine	.347	5.96	5.12	3.03	3.06	2.44	1.92	1.93
659	Methylene blue	.390	3.09	2.80	3.03	2.94	1.94	1.40	1.47
679	Safranine	.359	5.93	5.85	4.02	3.88	2.60	1.69	1.45
697	Induline (spirit-soluble)	.198	5.41	1.46	.53	1.21	.75	.94	.93
698	Nigrosine (spirit-soluble)	.126	1.11	.71	.71	.88	.70	.54	.52
699	Induline (water-soluble)	.258	1.51	.70	.67	1.03	.96	.82	.83
700	Nigrosine (water-soluble)	.149	.80	.63	.59	.72	.68	.53	.46
	Sulphur yellow	.....	.99	1.09	.83	.71	.73	.78	.73
720	Sulphur black	.100	.60	.29	.37	.25	.23	.21	.20
	Sulphur blue	.....	1.63	1.45	1.11	.98	.64	.60	.50
725	Sulphur brown	.107	.55	.48	.47	.35	.38	.40	.39
	Sulphur tan	.....	.90	.65	.34	.47	.59	.56	.48
739	Sulphur maroon	.186	.....	.....	1.23	1.62	.95	.79	.77
763	Indanthrene dark blue B O	.227	.....	.....	.....	2.12	2.31	1.65	2.00
778	Alizarin	.100	3.38	1.95	1.58	1.45	.65	.....	.55
779	Alizarin orange	.224	.....	.....	1.45	1.46	.....	.....	.....
782	Alizarin brown	.290	.88	.80	1.58	1.68	1.32	1.86	1.24
842	Indanthrene blue G C D	.354	.....	.....	6.96	2.40	2.41	.....	1.63
849	Indanthrene yellow	.334	.....	.....	17.62	4.68	3.76	.....	1.24
874	Indigo synthetic	.128	1.42	.88	.59	.74	.45	.25	.23
877	Indigo extract	.340	.38	.62	.64	1.00	.65	.45	.58

Relation of production to consumption.—Imports of synthetic dyes in 1923 were 3,098,193 pounds,[1] valued at $3,151,363. Production in that year amounted to 93,667,524 pounds, valued at $51,517,138. Imports were accordingly 3.3 per cent of the total output by quantity and 6.2 per cent by value. As the cost of the imported dyes to the consumer is greater than the invoice value, the true ratio of sales value of imports to the value of production is greater than the estimate of 6.2 per cent given.

The domestic exports of "color lakes and other colors, dyes, and stains" derived from coal tar for 1923 were 17,924,200 pounds, valued at $5,565,267. The domestic consumption of dyes is assumed to equal domestic production plus imports minus exports, or 78,841,517 pounds per year. This does not, however, take into consideration any stocks carried over. Imports constituted by quantity 3.9 per cent of the apparent consumption, and dyes produced in this country supplied the remaining 96.1 per cent. In 1914 imports were about nine-tenths of the domestic consumption.

Effect of the Ruhr occupation on domestic exports.—The general effect of the occupation of the Ruhr by the French, together with the export restrictions, the conflict between the French and German authorities, difficulties of transportation, and other conditions, resulted

[1] This total poundage is in excess of the quantity actually imported, most of the vat dyes having been reduced to a single-strength basis in order to facilitate comparison of imports and production of vat dyes on a uniform-strength basis.

in a large decrease in the total production of dyes in Germany, which amounted in 1923 to 25 per cent less than for the previous year. The occupation of the Ruhr had little effect on the supply of dyes for the domestic textile and other industries, as over nine-tenths of the domestic consumption is manufactured in this country.

The reduced production in Germany materially curtailed exports from that country, and important consuming countries in Far East markets, such as China, looked to the United States to supply a part of their requirements. As a result exports from the United States during 1923 were about double in quantity those of 1922 and they increased in value from $3,996,443 to $5,565,267. During the latter part of 1923 the output of dyes by Germany steadily increased, and the economic effect of the occupation of the Ruhr was being gradually overcome. Early in 1924 German dyes were again offering sharp competition to both domestic and British dyes in the markets of the Far East.

Continued production of new dyes.—An examination of the dyes for which production was recorded in 1923 shows the addition of nearly 100 new dyes to the United States manufacturing program. These were not restricted to any one class either by chemical derivation or by application on the fiber; they include dyes for silks, cotton, wool, color lakes, and for other purposes. The additions are almost entirely dyes of the special types consumed in relatively small quantities and are mostly colors of great complexity and difficult to manufacture, representing a creditable advance in the industry. The industry is still deficient to some extent in the production of certain vat dyes and certain other products, as shown by the analysis of imports, Table 15.

Reduction in duty.—Under the provisions of the tariff act of 1922 the ad valorem rates on the coal-tar products covered by paragraphs 27 and 28 will be reduced 15 per cent on September 22, 1924. The ad valorem rate on dyes and other finished products, paragraph 28, will be reduced from 60 per cent to 45 per cent, and that on intermediates, paragraph 27, from 55 per cent to 40 per cent. The specific duty will remain at 7 cents per pound.

In considering the effect of this reduction it should be borne in mind that the specific duty is more effective on the lower-priced dyes, while the ad valorem rate is more effective on the higher-priced products; the reduction in the ad valorem rate will therefore more directly affect the higher-priced dyes. The reduction will probably not greatly affect the larger tonnage of color produced in the United States, nor is it probable that it will seriously restrict the development of the dye industry, as the 15 per cent reduction is a minor factor when compared with the protection afforded by other provisions of the act.

The following table shows the actual and the equivalent ad valorem duty on seven groups of dyes ranging from $0.25 to $3 per pound under the tariff act of 1922, both for competitive and noncompetitive products. The duties resulting from the 60 per cent ad valorem rate (September 22, 1922, to September 22, 1924) and the 45 per cent ad valorem rate (beginning September 22, 1924) are separately tabulated.

TABLE 9A.—*Duty on dyes under the tariff act of 1922.*

Competitive dyes								Noncompetitive dyes							
7 cents plus 60 per cent ad valorem Sept. 22, 1922, to Sept. 22, 1924					7 cents plus 45 per cent ad valorem after Sept. 22, 1924			7 cents plus 60 per cent ad valorem Sept. 22, 1922, to Sept. 22, 1924					7 cents plus 45 per cent ad valorem after Sept. 22, 1924		
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Value of dye per pound	60 per cent duty	B plus 7 cents	Ad valorem equivalent of 7 cents	Ad valorem equivalent of C	45 per cent duty	F plus 7 cents	Ad valorem equivalent of G	Domestic selling price of imported dyes	"United States value"	60 per cent duty	K plus 7 cents	Equivalent ad valorem of L	45 per cent duty on J	N plus 7 cents	Equivalent ad valorem of O
			Per cent	*Per cent*			*Per cent*					*Per cent*			*Per cent*
$0.25	$0.15	$0.22	28	88	$0.113	$0.18	72	$0.25	$0.0697	$0.0418	$0.1118	44.7	$0.0314	$0.1014	40.6
.50	.30	.37	14	74	.225	.295	59	.50	.202	.1212	.1912	38.2	.0909	.1609	32.2
.75	.45	.52	9.3	69.3	.338	.408	54.4	.75	.334	.20	.27	36	.1503	.2203	29.4
1.00	.60	.67	7	67	.45	.52	52	1.00	.4665	.28	.35	35	.2099	.2799	28
1.50	.90	.97	4.7	64.7	.68	.745	49.7	1.50	.73	.438	.508	33.9	.3285	.3985	26.6
2.00	1.20	1.27	3.5	63.5	.90	.97	48.5	2.00	.995	.597	.667	33.35	.4478	.5178	25.9
3.00	1.80	1.87	2.3	62.3	1.35	1.42	47.33	3.00	1.52	.912	.98	32.7	.684	.754	25.1

PRODUCTION OF DYES BY CLASSES

dyes produced in the United States in 1923 are classified ing to method of application as follows: (1) Acid dyes, (2) lyes, (3) direct dyes, (4) lake and spirit-soluble dyes, (5) mor- r chrome dyes, (6) sulphur dyes, (7) vat dyes, subdivided into and other vats, and (8) unclassified dyes. While in certain he classification of a color is arbitrary, because a dye may have ties which permit of its application by more than one method, elieved that the above classifications facilitate the comparison duction and import figures.

production of dyes in the United States from 1917 to 1923, ve, as compared with imports during the fiscal year 1914 and lendar years 1920 to 1923, inclusive, are arranged according to isses given in Table 10.

10.—*Comparison of imports of dyes, by classes, fiscal year 1914, with domestic production, calendar years 1917–1923*

Class	1914		1917		1918	
	Imports	Per cent of total	United States production	Per cent of total	United States production	Per cent of total
	Pounds		*Pounds*		*Pounds*	
	9,286,501	20.2	9,372,121	20.4	9,799,071	16.8
	3,002,480	6.5	2,073,043	4.5	2,879,639	4.9
	10,264,757	22.3	11,181,761	24.3	12,285,683	21.1
spirit-soluble	1,512,605	3.3	934,360	2.2	1,068,466	1.8
and chrome	4,450,442	9.7	4,164,902	9.1	5,447,192	9.3
	7,053,879	15.4	15,588,222	33.9	23,698,826	40.5
nding indigo)	10,352,663	22.5	289,296	.6	3,281,337	5.6
ndigo	8,407,359	18.3	274,771	.55	3,083,888	5.3
ther vats	1,945,304	4.2	14,525	.05	197,449	.3
ed	27,568	.1	2,368,541	5.0	4,232	
al	45,950,895	100.0	45,977,246	100.0	58,464,446	100.0

Class	1919		1920			
	United States production	Per cent of total	United States production	Per cent of total	Imports	Per cent of total
	Pounds		*Pounds*		*Pounds*	
	12,195,968	19.2	17,741,538	20.1	733,405	21.5
	4,036,532	6.4	4,993,001	5.7	192,163	5.7
	14,444,934	22.8	19,882,631	22.5	571,581	16.8
spirit-soluble	1,813,199	2.8	2,205,281	2.5	17,527	.5
and chrome	3,985,050	6.3	3,900,209	4.4	709,482	20.9
	17,624,418	27.8	20,034,500	22.7	229,140	6.7
nding indigo)	9,252,982	14.6	19,338,099	21.9	932,464	27.4
ndigo	8,863,824	14.0	18,178,231	20.6	171,101	5.0
ther vats	389,158	.6	1,159,868	1.3	761,363	22.4
ed	49,111	.1	168,517	.2	16,820	.5
al	63,402,194	100.0	88,263,776	100.0	3,402,582	100.0

TABLE 10.—*Comparison of imports of dyes, by classes, fiscal year 1914, with domestic production, calendar years 1917–1923*—Continued.

Class	1921				1922			
	United States production	Per cent of total	Imports	Per cent of total	United States production	Per cent of total	Imports	Per cent of total
	Pounds		*Pounds*		*Pounds*		*Pounds*	
Acid	7,843,009	20.11	1,455,823	34.24	9,880,014	15.29	661,395	13.19
Basic	1,853,094	4.75	163,527	3.84	2,937,585	4.54	155,084	3.09
Direct	7,053,761	18.08	537,664	12.64	11,931,737	18.46	671,623	13.38
Lake and spirit-soluble	720,406	1.85	43,553	1.02	1,009,512	1.56	76,853	1.53
Mordant and chrome	3,997,442	10.25	695,961	16.36	3,749,701	5.80	716,790	14.28
Sulphur	10,239,255	26.25	220,938	5.20	16,913,767	26.17	194,882	3.89
Vats (including indigo)	7,019,120	17.99	1,116,345	26.25	16,926,744	26.19	1,548,024	30.84
(a) Indigo	6,673,968	17.11	70,975	1.66	15,850,732	24.52	505	.01
(b) Other vats	345,152	.88	1,045,370	24.59	1,075,992	1.67	1,548,519	30.84
Unclassified	282,603	.72	19,100	.45	1,283,127	1.99	16,981	.34
Total	39,008,690	100.00	4,252,911	100.00	64,632,187	100.00	5,982,631	119.16

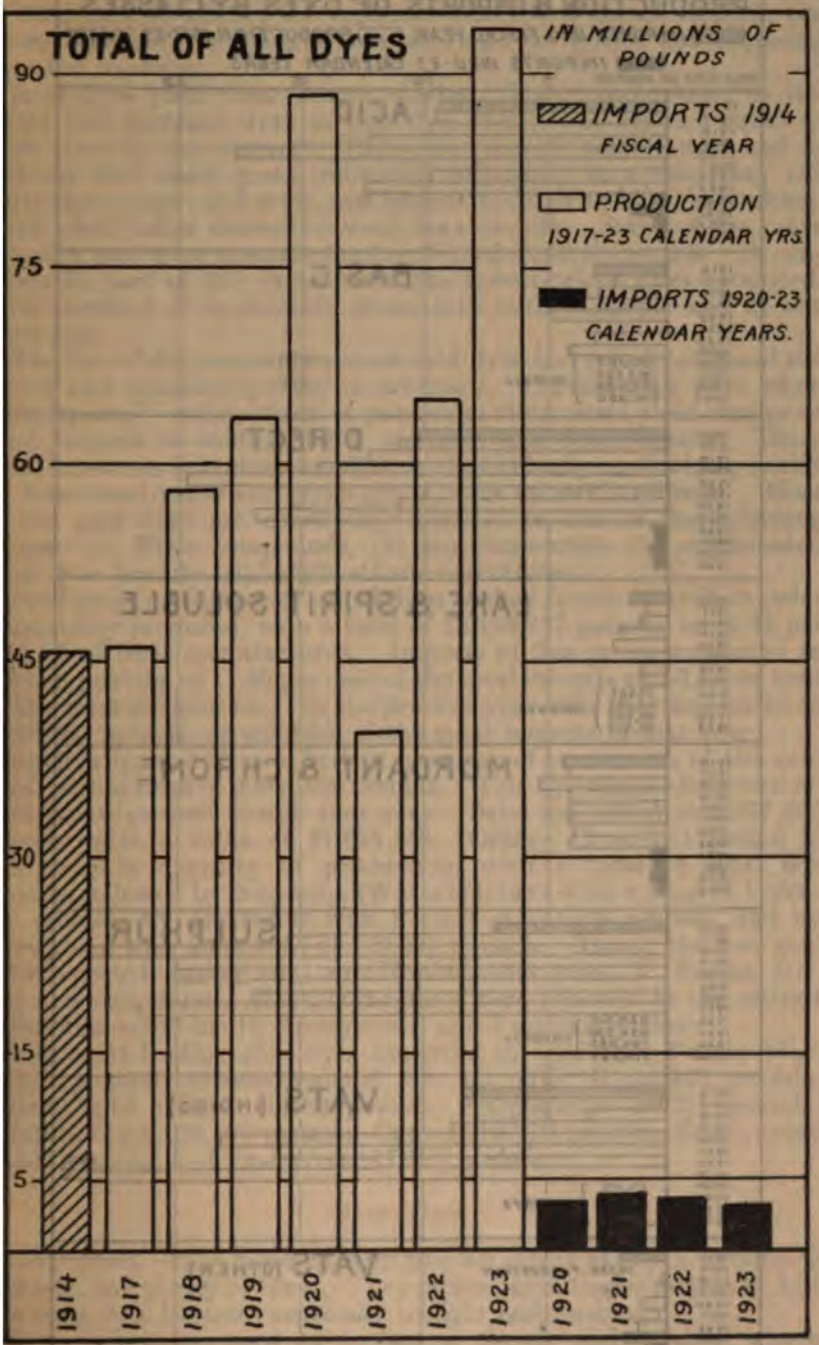
Class	1923			
	United States production	Per cent of total	Imports	Per cent of total
Acid	12,498,817	13.34	544,648	17.74
Basic	4,157,373	4.44	210,896	6.87
Direct	16,858,387	18.00	527,014	17.16
Lake and spirit-soluble	1,171,854	1.25	25,213	.82
Mordant and chrome	4,078,504	4.35	455,415	14.83
Sulphur	21,558,469	23.02	114,023	3.71
Vats (including indigo)	30,113,642	32.15	1,207,354	39.32
(a) Indigo	28,347,259	30.26		
(b) Other vats	1,766,383	1.89	1,207,354	
Unclassified and special	3,230,478	3.45	18,030	.59
Total	93,667,524	100.00	3,098,193	100.86

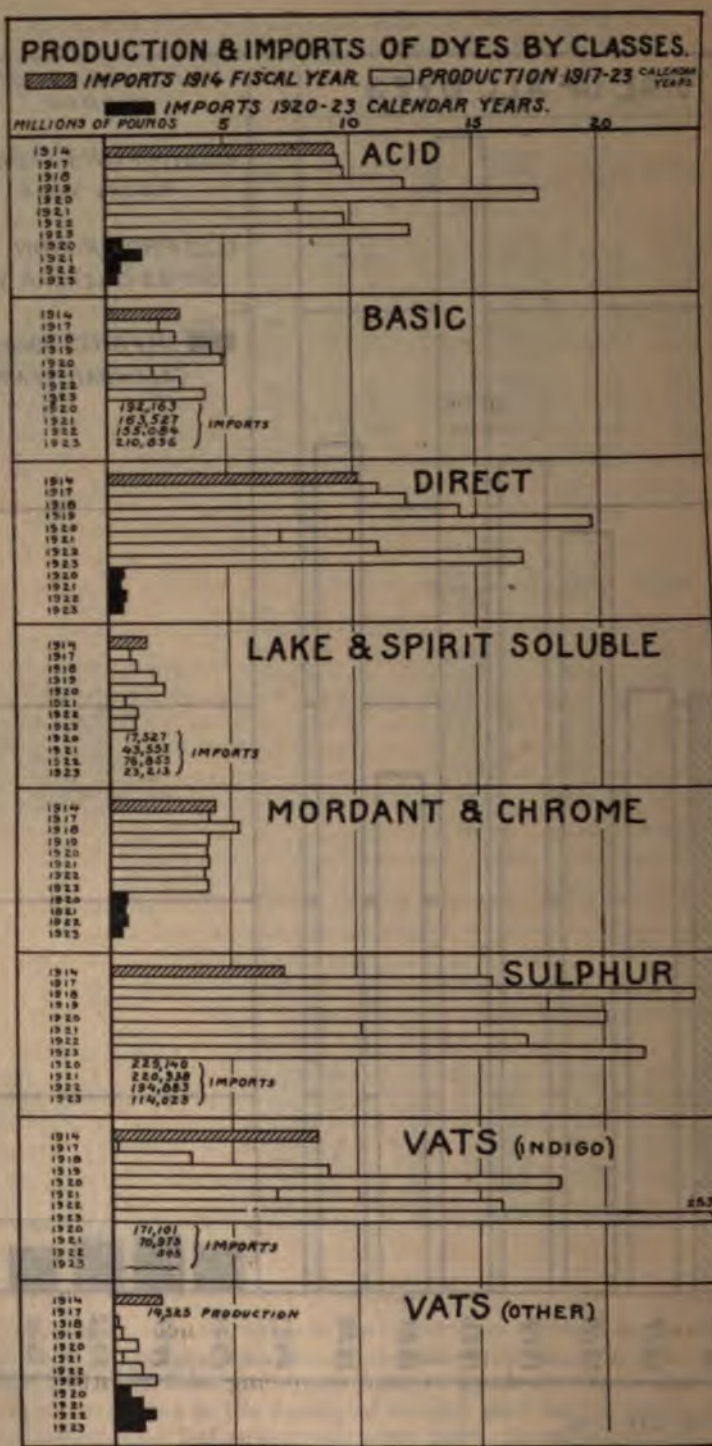
TABLE 10A.—*Production of dyes, by groups, according to unit value*

Group	1923		1922		1921	
	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total
6–25 cents	44,651,483	47.670	28,728,401	44.449	7,832,666	20.079
26–50 cents	15,205,298	16.234	10,237,825	15.840	7,941,977	20.360
51–75 cents	12,717,545	13.577	8,418,271	13.025	6,843,004	17.547
$0.76–$1	8,604,351	9.186	6,992,018	10.818	4,702,791	12.056
$1.01–$1.50	8,207,420	8.762	6,833,577	10.573	6,329,421	16.228
$1.51–$2	2,318,343	2.475	2,010,413	3.111	3,321,381	8.516
$2.01–$3	1,244,493	1.329	838,849	1.298	1,220,666	3.130
Over $3	718,590	.767	572,833	.886	756,254	1.939
Total	93,667,524	100.00	64,632,187	100.00	39,008,690	100.00

ACID DYES

Description.—The acid dyes are commonly applied in an acid bath; they have acid properties and are usually sodium salts of a color acid. They constitute the most important group used in wool dyeing, being especially adapted to the dyeing of hosiery and carpet yarns, suitings, dress goods, and hat materials; they have, in addition, considerable


TOTAL OF ALL DYES
IN MILLIONS OF POUNDS
IMPORTS 1914 FISCAL YEAR
PRODUCTION 1917-23 CALENDAR YRS.
IMPORTS 1920-23 CALENDAR YEARS.
90
75
60
45
30
15
5
1914
1917
1918
1919
1920
1921
1922
1923
1920
1921
1922
1923


PRODUCTION & IMPORTS OF DYES BY CLASSES.
IMPORTS 1914 FISCAL YEAR.
PRODUCTION 1917-23 CALENDAR YEARS.
IMPORTS 1920-23 CALENDAR YEARS.
MILLIONS OF POUNDS
5
10
15
20
ACID
BASIC
192,163
163,527
158,084
210,856
IMPORTS
DIRECT
LAKE & SPIRIT SOLUBLE
17,527
43,553
76,853
23,213
IMPORTS
MORDANT & CHROME
SULPHUR
225,140
220,388
194,083
114,023
IMPORTS
VATS (INDIGO)
171,101
76,870
IMPORTS
VATS (OTHER)
19,385 PRODUCTION

cation on silk. They are little used on cotton or linen because eir lack of affinity for vegetable fibers, but are of value in the ıg of jute. In general they are used on goods not requiring ıted washings.

id dyes yield clear, bright shades. They are superior to the t and mordant dyes in purity of shade, but are not equal to dyes in this respect. They have a wide color range, and in ess they show great individual variation; as a rule they are fast to light and acids, and have a tendency to bleed in washing. yield faster shades on wool than on silk. Some of the more ılex acid dyes produce shades of good general fastness. A con- able part of this group is of the lowest-priced dyes produced. r method of application in an acid bath is simple and of low cost.

ıe line of demarcation between acid dyes and certain colors of the t and mordant groups is arbitrary. Certain acid dyes when ertreated" with sodium or potassium dichromate yield shades of fastness to milling, light, washing, and other agents. These known as acid chrome colors, are used chiefly on wool, especially ıose wool yarns and piece goods, such as men's suitings. Most ıe acid dyes are chemically included in one of the following ps: (1) Nitro compounds, (2) azo compounds, (3) sulphonated dyes (mostly triphenylmethane derivatives).

oduction and imports.—Acid dyes ranked fourth in 1923 in order ıantity produced, with a total of 12,498,817 pounds, or 13.34 per of all dyes manufactured. Imports of this group amounted to)48 pounds, or 17.56 per cent of the total imoprts and 0.6 per cent e total production. In the pre-war year 1914 they amounted to ,501 pounds, or one-fifth of the total imports of that year.

alma black 10B was first in quantity of production of the acid with a total of 2,568,458 pounds. This dye ranked fourth of all manufactured during that year. Sales amounted to 2,377,290 ds, with a value of $1,694,148. Orange II ranked second in group in quantity of production, with a total of 1,617,668 ds, followed by Nigrosine (Water soluble), with a total of 1,389,- ounds, by Tartrazine with a total of 735,608 pounds, and by rubine with an output of 526,596 pounds. Among the new acid reported during 1923 are Naphthalene green V, Eosine BN, Azo acid violet. Notable increases were reported in the output lphon acid blue R, Eriocyanine, and Fast light yellow.

e eight leading acid dyes imported in 1923 were Patent blue, 9 pounds; Alizarin rubinol 3G, 5G, GW, R, 48,826 pounds; ne light yellow, 46,886 pounds; Erioglaucine, 38,254 pounds; ine black, 33,500 pounds; Cyanol, 19,979 pounds; Eriocyanine 2 pounds; and Fast green, 17,190 pounds.

Basic Dyes

scription.—The basic dyes surpass all others in depth, brilliancy ıde, and purity of tone. They possess high tinctorial power, but lass lack fastness, especially to light and washing.

sic colors are used on cotton in dyeing and printing where t shades or color tints are desired without special requirements

for fastness. They are also employed in the dyeing of paper and jute and for lithographic inks, typewriter ribbons, copy paper, and pencils. With the exception of Rhodamine B and a few others they have little application on wool. Dyes of this class are chemically basic in character and are fixed on vegetable fibers with an acid mordant, namely, tannic acid.

They are historically the oldest of the coal-tar dyes. Mauve or Perkin violet, discovered by W. H. Perkin in 1856, was the first aniline dyestuff produced on a commercial scale. Basic dyes are not as important as formerly; for cotton dyeing they have been superseded by direct and sulphur dyes, which possess advantages in economy of application and in many cases excel in fastness. In wool dyeing the acid dyes have almost entirely displaced the basic colors. Chemically the basic dyes include a large number of the triphenylmethane derivatives and, in addition, members of the following classes: (1) Azines, (2) azos, (3) thioazines, (4) thioazols, and (5) acridines.

Production and imports.—Basic dyes in 1923 ranked fifth in quantity of production, with an output of 4,157,373 pounds, or 4.44 per cent of the total. Imports in that year amounted to 210,896 pounds, or one-fourth of 1 per cent of production. The production of this group of dyes is well developed in this country. Bismarck brown 2R leads this group, with an output of 672,544 pounds, followed by Methyl violet, with an output of 578,183 pounds, and Chrysoidine Y, with an output of 545,836 pounds. The output of Auramine, 471,359 pounds, showed a conspicuous increase over that of 1922, when the production was only 344,827 pounds. Large increases in the production of Phosphine and Rhodamine B constitute the outstanding development in the production of this group of dyes during 1923.

The five leading basic dyes (by quantity) imported in 1923 were Phosphine, 42,176 pounds; Rhodamine 6G, 31,242 pounds; Rhodamine B, 29,083 pounds; Thioflavine T, 20,283 pounds; and Euchrysine, 9,483 pounds.

Direct Cotton Dyes

Description.—The direct or substantive dyes have been introduced within the past 25 years. Their method of application is simple, as they dye vegetable fibers full shades in a neutral or alkaline bath, "directly," without the use of mordants. Although their principal application is on cotton, they are of special value in dyeing fabrics containing both cotton and wool, or silk and cotton (union goods). They are also used on linen, silk, and paper and to an increasing extent on wool, especially for knitting yarns, worsted and shoddy yarns, and loose wool.

In fastness, individual dyes of this group show a wide variation. On account of their high solubility they have a tendency to run when washed. Many direct dyes, particularly those first introduced, are sensitive to acids and fade on exposure to sunlight; others, especially the newer direct dyes, have good fastness to both acids and light as well as to other agents. Certain direct colors are of good fastness, particularly to washing, after a treatment of the dyed fiber by "coupling" with certain intermediates. An aftertreatment with metallic

salts or formaldehyde also improves the fastness of certain direct dyes. These "developed" direct dyes were not available in the early part of the war; the ordinary direct dyes then used for hosiery were unsatisfactory to consumers. Developed blacks, such as Zambesi black V, are now manufactured in this country for hosiery.

With a few exceptions the direct dyes are chemically "azo" compounds and are nearly all derivatives of benzidine, tolidine, diamino stilbene, or a group closely approximating one of these. A small but valuable group of direct colors belongs in the thiazol class.

Production and imports.—The direct cotton dyes, with a production of 16,858,387 pounds, ranked third in quantity of production, comprising 18 per cent of all dyes produced. Imports of this group in 1923 were 527,014 pounds, which may be contrasted with 10,264,757 pounds in 1914. The first direct cotton dye by quantity of production was Direct black EW, with an output of 6,957,581 pounds. This ranked third, or 7.4 per cent, of all dyes produced in that year. Sales of this color in 1923 were 6,720,905 pounds, with a value of $2,875,928.

Benzo blue 2B ranked second in this group, with an output of 1,065,539 pounds, followed by Benzamine brown 3GO, with a production of 999,554 pounds, and Oxamine black BHN, with a total of 905,491 pounds. Congo red ranked fifth, with a production of 590,548 pounds.

One of the more important developments in the production of this group of dyes consists in the continued addition to the range of "developed" direct dyes capable of producing shades of good fastness on cotton and silk. Production of Zambesi blacks recorded a notable increase, and among the new direct colors are Erica B, Terra cotta F, Neutral gray B, Diaminogene B, Congo rubine, Benzo fast red, Chicago blue 2R, Diazo indigo blue M, and Direct black V.

The eight leading direct dyes, by quantity, imported in 1923, were Diaminogene blue, 88,778 pounds; Diaminogene B, 32,903 pounds; Trisulphon brown B, 26,980 pounds; Diphenyl red, 21,160 pounds; Diamine fast orange EG, ER, R, 17,793 pounds; Diphenyl brown BN, 17,534 pounds; Benzo fast blue, 17,036 pounds; and Trisulphon brown GG, 16,150 pounds.

Mordant and Chrome Dyes

Description.—These colors, in conjunction with metallic mordants, such as salts of chromium, aluminum, iron, and tin, dye both vegetable and animal fibers. The resulting shades are, in general, of exceptional fastness to color-destroying agents. The mordant dyes yield on wool the fastest shades to light, washing, and other agents. They are also important in textile printing, particularly on cotton piece goods, but are little used on silk.

The mordant dyes are frequently designated as chrome colors. As many of these colors are derived from alizarin, they were formerly called alizarin dyes. Certain dyes may be acid, acid chrome, or chrome, according to the method of application. The true alizarins are generally used with a mordant; some of the new alizarins, known as acid alizarins, can be used either with or without. In the application of chrome dyes on wool, the mordant may be applied before, during, or after the dyeing operation. The labor cost of dyeing with mordant and chrome dyes is higher than for other groups.

The most important dye of this class, alizarin, is used in the production of the well-known Turkey red on cotton. This is one of the shades produced in ancient times from madder root. Alizarin has been prepared synthetically from anthracene for about 50 years.

Chemically, the mordant dyes are members of the following classes: (1) Anthracene, (2) azo, (3) oxazine, (4) triphenylmethane, (5) nitroso, (6) oxyquinone, and (7) xanthone.

Production and imports.—The output of mordant and chrome dyes was 4,078,504 pounds, or 4.35 per cent of all dyes manufactured in 1923. Imports of this class in that year were 453,415 pounds, or one-half of 1 per cent of production and 14.6 per cent of the total import. Imports in the pre-war year 1914 amounted to 4,450,442 pounds.

Salicine black U ranked first in quantity among the mordant and chrome dyes, with a production by 14 firms of 1,242,283 pounds and sales of 1,290,536 pounds, valued at $686,266. Other leading dyes of this group include Alizarin yellow G, with an output of 395,361 pounds; Alizarin saphirol B, 309,124 pounds; and Metachrome brown B, 308,559 pounds.

The rapid increase in the production of Eriochrome black T and A during the last two years is reflected in a decrease in the imports of these two dyes. Notable increases were recorded in the output of Alizarin brown, Alizarin GI, Palatine chrome red B, and Alizarin. Among the new mordant and chrome dyes produced in 1923, not reported in 1922, are Anthracene blue, Acid alizarin black R, and several unidentified chrome browns.

The five leading mordant and chrome dyes, by quantity, imported in 1923 were Alizarin blue black, 70,917 pounds; Gallamine blue, 29,244 pounds; Alizarin, 27,716 pounds; Alizarin saphirol B, 26,615 pounds; and Alizarin red, 25,017 pounds.

Sulphur Dyes

Description.—This group of dyes produces heavy deep shades of blue, green, brown, and black. They are used almost entirely in cotton dyeing, being especially adapted to uniform cloths, hosiery, gingham yarns, and cotton warps to be woven with wool and later dyed with acid dyes. Their greatly extended use during the war served to increase permanently their application in cotton dyeing. Sulphur colors are also used in the dyeing of linen and artificial silk.

The sulphur dyes possess excellent fastness to washing, fulling, alkalies, and acids in cross dyeing. With some exceptions, their fastness to light is good. As they are not fast to chlorine, they do not withstand the repeated bleaching action of hypochlorites in the modern laundry treatment. They are applied in a sodium sulphide solution with, in certain cases, aftertreatment with metallic salts to improve their fastness. The first dye discovered in this group, "Cachou de Laval," was made in 1867 by the fusion of sawdust with sodium sulphide and sulphur. Sulphur dyes are now prepared by the fusion of various intermediates (containing the nitro, amino, or imino groups) with sodium sulphide and sulphur. These dyes are not pure, distinct compounds, and the presence of other substances renders them of comparatively low color value. Recent developments, however, have greatly increased the tinctorial value and shade range of many of them.

Production and imports.—This group of dyes ranked second in quantity of production, with a total of 21,558,469 pounds, equivalent to 23.02 per cent of all dyes produced in 1923. The domestic production of sulphur dyes has been well developed both in quantity and variety for several years. This is indicated by the relatively small quantity of sulphur colors imported, constituting in 1923 only one-tenth of 1 per cent of the total production. Sulphur black ranked second among all dyes manufactured in 1923, with an output of 16,276,409 pounds, or 17.4 per cent of the total. Sales during 1923 were 15,212,142 pounds, valued at $3,017,207. The production of sulphur browns totaled 2,203,893 pounds; of sulphur blues, 1,349,864 pounds; of sulphur yellow, 670,023 pounds; and of sulphur maroon, 373,899 pounds.

The five leading sulphur dyes imported in 1923 were:

	Pounds
Thionol brown	28,802
Cross dye green B	26,242
Eclipse brown	10,000
Thional brown G	9,228
Pyrogene blue	8,929

Vat Dyes

Description.—Because of their exceptional fastness, variety, and beauty of shade, vat dyes are of special importance for cotton goods where laundry-fast dyes are desired. They are used on both dyed and printed shirtings, on blouse material, dress goods, ginghams, muslin curtains, and other cotton wash goods, and have a limited application on silk and wool. Because of their high cost, they have a comparatively limited use in solid or heavy shades, but they are used for color stripes or for small printed patterns on a white background. They possess technical advantages in application over the alizarin mordant dyes.

Vat dyes as a class possess exceptional fastness to light, washing, acids, alkalies, and to chlorine. Some of them are not fast to all of these agents. With a gradual increase in demand by the ultimate consumer of textiles for fast-dyed fabrics, the consumption of vat dyes is increasing. As cotton goods dyed with these colors withstand the severe treatment of the modern laundry, the relatively high cost of dye per yard is a minor factor compared with the increased life of a fabric dyed with fast colors.

With the exception of indigo, one of the oldest dyes known, vat dyes are of recent origin. They are among the most complex of dyes, difficult to manufacture, and relatively high in cost. Chemically divided, they consist of indigoids (including thioindigoids), anthraquinone derivatives, and the carbazole derivatives.

Production and imports.—The production of vat dyes, including indigo, again led by quantity, in 1923 totaling 30,113,642 pounds (32.15 per cent of the total output), compared with 16,926,744 pounds for the previous year.

The indigo output of 28,347,259 pounds was greater than that of any other single dye, comprising 30.26 per cent of the total domestic output. This represents a very large increase over the 1922 output of 15,850,752 pounds. This increase may be accounted for in large part by the exports of this dye to China, as a result of the reduced exports of Germany following the occupation of the Ruhr district.

The output of vat dyes (other than indigo) in 1923 was 1,766,383 pounds—the largest in the history of the domestic industry and an increase of 690,391 pounds over that of 1922.

Among the vat dyes other than indigo, Indanthrene yellow led in quantity of production, with an increase in output of 170 per cent over that of 1922. Indanthrene blue GCD, second in quantity of output, showed an increase over the 1922 production. Among the new vat dyes reported as produced during 1923 are, Indanthrene violet B, Indanthrene blue 3G, Hydron pink FF, and Indanthrene golden orange R.

In 1914 imports of vat dyes other than indigo were 1,945,304 pounds, and none of these dyes were produced in this country in that year; in 1920, a year of great business activity, domestic production plus imports was 1,921,231 pounds. In 1921, a year of business reaction, the corresponding total was 1,390,522 pounds, and for 1922, 2,624,511 pounds, increasing to a maximum of 2,973,937 pounds in 1923.

The nine leading vat dyes, by quantity, imported in 1923 were:

	Pounds
Indanthrene yellow (single strength)	87,940
Indanthrene golden orange R (single strength)	79,717
Indanthrene blue GCD (single strength)	70,546
Indanthrene golden orange G (single strength)	67,265
Ciba violet B (single strength)	64,517
Hydron pink FB, FF (single strength)	55,425
Algol brown B (single strength)	55,081
Helindone pink B, R, RN (single strength)	47,771
Indanthrene green B (single strength)	40,420

Color-lake and Spirit-soluble dyes

These dyes constitute one of the smaller groups. The color lake dyes are used in the preparation of a class of pigments known as color lakes, discussed in detail under that heading.

The spirit-soluble dyes are insoluble in water, but dissolve in either oils, fats, or various organic solvents; they consequently find application for coloring varnishes (both spirit and oil), fats, oils, waxes, and similar products. As many of the spirit-soluble dyes are converted by chemical treatment, such as sulphonation, into water-soluble dyes for use in textile dyeing, they may be considered as partly completed dyes.

The output of lake and spirit-soluble dyes in 1923 was 1,171,854 pounds, or 1.25 per cent of the total dye production. Of these, 57 per cent were lake dyes and 43 per cent spirit-soluble dyes. In 1922 the output was 1,009,512 pounds. Imports of this group in 1923 amounted to 23,213 pounds, or 0.75 per cent of the total imports of coal-tar dyes.

Food Dyes

Dyes classified under this group include a limited number of selected dyes which meet the specifications of the Bureau of Chemistry, Department of Agriculture. There are also included the figures for a highly refined grade of methyl violet, used for marking meats and certain other food products. The total production of food dyes in 1923 was 230,343 pounds, with sales of 228,686 pounds, valued at $860,077. Production in 1922 was 186,600 pounds, and in 1921, the first year in which they were separately compiled, 50,709 pounds. The average value of the sales was $3.76 per pound in 1923, $3.82 in 1922, and $5.80 in 1921.

DYES EXPORTED FROM THE UNITED STATES

Large increase in 1923.—The total exports of "color lakes" and "other colors, dyes, and stains" in 1923 amounted to 17,924,200 pounds, valued at $5,565,267. This is slightly more than double the quantity exported in 1922 and a 40 per cent increase by value.

Prior to 1922 the Department of Commerce reported only the value of exports of domestic dyes and dyestuffs, using the following groups: (1) Aniline dyes, (2) logwood extracts, (3) all other dyes and dyestuffs. The third classification covers both coal-tar dyes and natural dyes, other than logwood extract. Since logwood extract is by far the most important natural dye exported from the United States it is reasonable to assume that a large part of the figures returned for all other dyes and dyestuffs covers coal-tar dyes. The most important natural dye included in Group 3 is derived from the bark of the black oak (*Quercus velutina*) in two forms, viz., quercitron and flavine. These were exported in considerable amounts during the war and in smaller amounts previously. In 1922 the Department of Commerce adopted a new classification, grouping coal-tar dyes under (1) color lakes and (2) other colors, dyes, and stains. For the first time the quantity as well as the value of the exports was published. Table 11 shows by months the total exports of dyes from the United States from 1919 to April, 1924, inclusive.

The countries to which dyes are exported are shown in detail in Part VI, Appendix.

The combined value of exports of "aniline dyes" and "all other dyes" was $15,728,499 in 1919, compared with $29,823,591 for 1920, the highest in the history of the industry. This was during a year of world-wide business activity, prior to the reappearance of German dyes in international trade.

Exports of "color lakes" in 1922 were 28,228 pounds, with a value of $19,928, and the total exports of "other colors, dyes, and stains" were 8,315,959 pounds, with a value of $3,976,515, making a total of 8,344,187 pounds and a value of $3,996,443. The total export of "coal-tar colors, dyes, and stains" for 1923, as reported in the Monthly Summary of Foreign Commerce, was 17,924,200 pounds, with a value of $5,565,267. No exports of color lakes were reported in that year. In January, 1924, exports of "other colors, dyes, and stains" were 1,432,721 pounds, valued at $494,666, and for the month of February 1,739,400 pounds, valued at $571,776. The large increase in exports of dyes in 1923, compared with 1922, was largely due to the effect of the occupation of the Ruhr by the French in 1923, as a result of which German production was greatly reduced and the export trade of that country in dyes and chemicals was severely affected. The monthly production of the German dye plants increased rapidly in the later months of 1923 and in the early months of 1924, indicating that interference with Germany's dye production had practically disappeared. In fact, there have been, in 1924, unceasing efforts by German manufacturers in the Far East and other large dye markets to recapture those lost markets by the initiation of a price-cutting campaign.

TABLE 11.—*Domestic exports of dyes, by months, 1919–1924 (four months)*

Month	1919			1920		
	Aniline dyes	All other dyes [1]	Total	Aniline dyes	All other dyes [1]	Total
January	$1,405,017	$755,382	$2,160,399	$917,574	$372,468	$1,290,042
February	1,231,355	617,050	1,848,405	1,850,682	379,825	2,230,507
March	492,291	278,591	770,882	2,648,615	850,695	3,499,310
April	777,123	359,512	1,136,635	1,820,771	891,487	2,712,258
May	585,970	239,744	825,714	2,180,606	817,713	2,998,319
June	858,661	475,571	1,334,232	2,389,515	1,239,191	3,628,706
July	574,274	267,425	841,699	1,770,780	947,431	2,718,211
August	761,009	350,491	1,111,500	1,151,196	623,181	1,774,377
September	785,497	557,005	1,342,502	2,114,915	551,113	2,666,028
October	1,037,708	453,390	1,491,098	1,802,142	334,167	2,136,309
November	887,710	300,041	1,187,751	2,006,534	211,465	2,217,999
December	1,327,456	350,226	1,677,682	1,788,170	154,415	1,942,585
Total	10,724,071	5,004,428	15,728,499	22,450,480	7,373,111	29,823,591

Month	1921		
	Aniline dyes	All other dyes [1]	Total
January	$943,595	$349,174	$1,292,769
February	397,123	72,541	469,664
March	574,969	95,322	670,291
April	305,760	39,250	345,010
May	278,331	91,753	370,084
June	444,273	81,477	525,750
July	310,357	65,626	375,983
August	513,012	70,663	583,675
September	322,477	70,228	392,705
October	349,981	73,705	423,686
November	372,244	78,703	450,947
December	254,878	94,656	349,534
Total	5,067,000	1,203,139	6,270,139

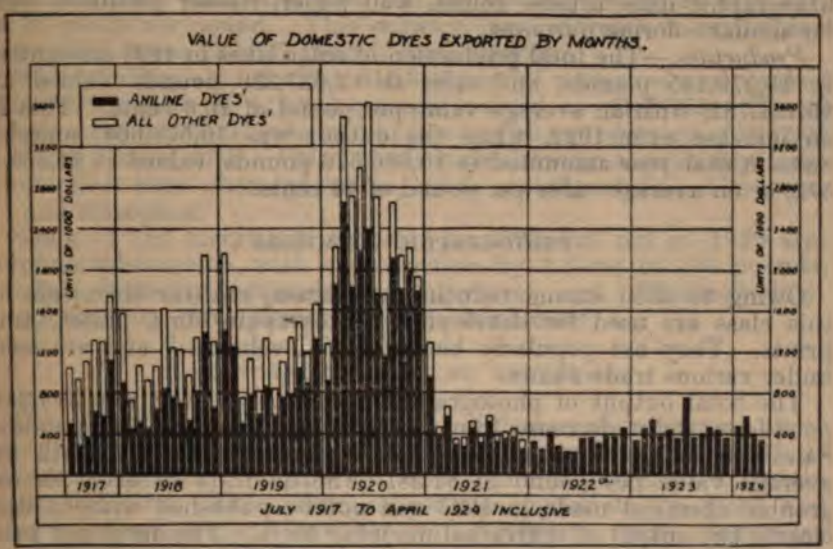
Month	1922					
	Color lakes		Other colors, etc.		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
January	5,059	$4,188	364,971	$325,048	370,030	$329,236
February	6,796	5,124	298,364	230,544	305,160	235,668
March	3,612	3,162	708,792	405,250	712,404	408,412
April	8,446	2,105	581,367	271,571	589,813	273,676
May	401	500	328,733	227,898	329,134	228,398
June	282	361	398,975	222,370	399,257	222,731
July	356	249	726,624	364,737	726,980	364,986
August	593	411	896,701	383,692	897,294	384,103
September	341	607	664,348	304,022	664,689	304,629
October	576	890	954,922	399,439	955,498	400,329
November	1,702	2,228	1,084,890	395,579	1,086,592	397,807
December	64	103	1,307,272	446,365	1,307,336	446,468
Total	28,228	19,928	8,315,959	3,976,515	8,344,187	3,996,443

[1] Commerce and Navigation reports under domestic exports of "dyes and dyestuffs"—"aniline dyes," "logwood extract," and "all other dyes and dyestuffs." Under this last-named designation must be included both natural and coal-tar dyes. However, since logwood extract—shown separately—is the most important natural dye exported from the United States, it may be assumed that a considerable portion of the exports under "all other dyes and dyestuffs" are coal-tar dyes.

TABLE 11.—*Domestic exports of dyes, by months, 1919–1924 (four months)*—Continued

Month	1923		Month	1923	
	Other colors, dyes, and stains			Other colors, dyes, and stains	
	Pounds	Value		Pounds	Value
January	821,847	$332,008	August	1,008,878	$388,815
February	1,338,395	443,505	September	1,514,228	402,751
March	1,606,168	513,129	October	1,543,869	474,215
April	1,690,402	498,421	November	1,300,927	433,892
May	1,830,068	539,358	December	1,261,631	377,684
June	1,002,256	383,321			
July	2,915,531	778,168	Total	17,924,200	5,365,267

Month	1924		Month	1924	
	Other colors, dyes, and stains			Other colors, dyes, and stains	
	Pounds	Value		Pounds	Value
January	1,432,721	$494,666	March	1,244,264	$408,029
February	1,739,400	571,776	April	1,014,824	344,605



[1] The domestic exports of dyes, as shown by the Commerce Department, are divided into 3 groups—(1) aniline dyes, (2) logwood extract, and (3) all other dyestuffs.

The third classification may include both natural dyes (other than logwood extracts, shown separately) as well as coal-tar dyes. Since logwood extract, however, is the most important natural dye exported from the United States, it is reasonable to assume that a considerable portion of "all other dyes and dyestuffs" represents coal-tar dyes.

In 1922, however, the Commerce Department adopted a new classification. Coal-tar dyes were grouped under coal-tar finished products and were divided into (1) color lakes and (2) other colors, dyes and stains.

Other Finished Coal-Tar Products

COLOR LAKES

Description.—A color lake is an insoluble color pigment consisting of a precipitating agent, the coloring matter (a coal-tar dye), and a carrier (the base). The desired properties of a color lake are good coloring power, easy workability, brightness, and fastness to weather, light, alkali, and acids. The precipitating agents used for coal-tar colors include barium chloride, lead salts, aluminium hydroxide, and tannin or tannin tartar-emetic. Among the more important carriers are aluminium hydroxide, zinc white, lithopone, barytes, whiting, China clay and certain native clays, and ocher. The principal requirements of a carrier are (1) ready reduction to a finely divided state and (2) absence of any deleterious effect on the shade of the finished lake. The coloring matter includes those coal-tar dyes known as acid dyes, basic dyes, and mordant dyes, as well as certain azo dyes produced directly on the carrier. An example of the latter is the preparation of Para red from the intermediates p-nitroaniline and b-naphthol. Another group of color lakes is made by the precipitation of a water-soluble acid dye, with the aid of the mineral salt to form an insoluble product.

After precipitation the soluble lake is filtered, dried, and ground with or without oil; it is then ready for use as a pigment in paints, lithographic inks, artists' colors, wall paper, rubber products, and for similar coloring purposes.

Production.—The total production of color lakes in 1923 amounted to 13,079,115 pounds, and sales to 12,627,359 pounds valued at $5,124,732, with an average value per pound of 40.6 cents. This is an increase over 1922, when the output was 10,578,664 pounds. Sales in that year amounted to 10,366,676 pounds, valued at $4,551,572, or an average value per pound of 44 cents.

PHOTOGRAPHIC CHEMICALS

Owing to their strong reducing properties, coal-tar chemicals of this class are used for developing photographic films, plates, and prints. They are popularly known as "developers," and are sold under various trade names.

The total output of photographic chemicals in 1923 was 343,289 pounds, a slight decrease from the 1922 figure of 345,798 pounds. Sales for 1923 were 321,083 pounds, valued at $443,697, with an average value per pound of $1.38. The quantity of each photographic chemical made in 1923 can not be published without disclosing the output of individual manufacturers. The developer produced in largest quantity was hydroquinol, followed by p-hydroxyphenylglycine. The 1923 production of the latter shows a large increase, while that of metol (methyl-p-aminophenol sulphate) shows a decrease.

MEDICINALS

Description.—From the standpoint of national welfare this class of coal-tar derivatives is of high importance. Chemically, it includes a variety of products used for a diversity of purposes. The develop-

of medicinals constitutes one of the most creditable accom-
ients of the coal-tar industry, as the highest technical skill is
ed in their manufacture.

duction.—The total production of medicinals in 1923 was
085 pounds; sales were 2,995,448 pounds, valued at $4,720,253,
erage price of $1.58 per pound. Production in 1922 was
347 pounds, with sales of 3,092,915 pounds valued at $4,233,443.
phenamine, known also as salvarsan and as "606," the hydro-
le of 3-diamino-4-dihydroxy-1-arsenobenzene, used for com-
syphilis and other protozoan infections, is one of the most
tant medicinals of this group. Its production by 7 manu-
ers in 1923 was 616 pounds; sales were 576 pounds, valued at
81, or $301.01 per pound, as compared with 917 pounds,
l at $257,022—$280.28 per pound—in 1922. Neoarsphenamine
mino-4-dihydroxy-1-arsenobenzene methanol sulphoxylate) had
l production, by 6 manufacturers, of 3,365 pounds. Total
were 3,035 pounds, valued at $1,029,121, an average price of
8 per pound.

irin (acetylsalicylic acid) led all coal-tar medicinals in quantity
ced with an output, by 4 firms, of 1,525,795 pounds, compared
,482,998 pounds in 1922. Sales in 1923 were 1,337,998 pounds,
l at $1,088,977. This shows an increase in the price per pound
74 cents in 1922 to 81.3 cents in 1923. Acetanilide, of which
8 pounds were produced by 4 firms, ranked second in quantity
factured; total sales were 520,390 pounds, valued at $156,111,
cents per pound. This shows a large increase in production
922, when 222,517 pounds were recorded.

ium salicylate, of which 416,382 pounds were produced, ranked
with sales of 410,840 pounds, valued at $165,759. Phenol
nates (calcium, sodium, zinc, etc.), with a production of 208,902
s, ranked fifth. Other medicinals showing a relatively large
ction were phenolphthalein, salol, acetphenetidin, chloramine
l cincophen.

ie of the medicinals reported in 1923 but not in 1922 are:
arsphenamine, with a production by 4 firms of 164 pounds;
a (1-diethylbarbituric-2-amidopyrene) and dihydroxy-dihy-
-mercury benzophenone sodium sulphonate.

FLAVORS AND PERFUME MATERIALS

cription.—There is no sharp line of demarcation between these
asses of coal-tar chemicals, many of them being used both as
and perfumes; a separate classification is, therefore, in certain
arbitrary. They serve as perfume materials for soaps and
toilet articles, and for other similar products, and as flavors for
nd food products.

duction.—The total production of flavors in 1923 was 1,458,024
s; sales amounted to 1,442,387 pounds, valued at $1,780,313.
2, production amounted to 1,215,668 pounds.

ie of these products show a large increase in production,
y saccharin, used as a sugar substitute, and methyl salicylate,
largely as an artificial wintergreen flavor. The total 1923
ction of methyl salicylate was 967,505 pounds.

output of perfume materials in 1923 was 1,365,449 pounds,
eing a large increase over 1922, when 793,148 pounds were

produced. Sales of these products in 1923 totaled 1,275,432 pounds, valued at $789,431.

Diethylphthalate ranked first in quantity of production and value of sales. The production in 1923 was 1,250,280 pounds; sales were 1,170,939 pounds, valued at $592,039. Production in 1922 was 725,984 pounds. Diethylphthalate is used under a special formula as an ethyl alcohol denaturant. The production of benzyl benzoate for 1923 was 29,185 pounds, an increase over that of 1922. Two other benzyl compounds showing increases in production for 1923 are benzyl alcohol and benzyl acetate, with a production of 12,080 and 21,937 pounds respectively.

Other products of this group made in quantity are amyl salicylate, diphenyl oxide, benzylidene acetone, methyl anthranilate, and phenyl acetic acid. The production of phenyl ethyl alcohol shows a large increase over the 1922 figure, but the quantity produced is still far below the domestic consumption. Production of phenylacetic aldehyde and cinnamyl alcohol is also below the domestic demand; artificial musks are not reported at all, although large quantities are imported.

Among products reported in 1923 but not in 1922 were benzyl propionate, para cresyl acetate, para cresyl phenyl acetate, dibenzyl ketone, ethyl fumarate, and phenyl glycol acetate.

SYNTHETIC PHENOLIC RESINS

The manufacture of synthetic resins is distinctly an American development and has resulted only from the most careful research and engineering skill. These were first made by the condensation of phenol with formaldehyde and ammonia and later with hexamethylenetetramine, but in recent years para-cumarone, as well as cresol, has been used as a base. Synthetic resins are used as a substitute for amber in the manufacture of pipe stems, cigarette holders, and similar articles. There is also a large consumption for electric insulating materials and for varnishes and lacquers. The consumption for radio equipment has shown a rapid increase. With a total production for 1922 of 5,944,133 pounds, sales were 6,415,931 pounds, valued at $4,315,196. Production for 1923 shows an increase, but figures cannot be published without disclosing the operations of individual concerns.

SYNTHETIC TANNING MATERIALS

The synthetic tanning materials known as "syntans" are of very recent development, having come into commercial use in Germany and England since 1912. They give considerable promise for use in the tanning of leather in conjunction with natural tanning extracts.

Synthetic tans are made by condensation of certain coal-tar derivatives, such as the sulphonated phenols, cresols, and naphthols, with formaldehyde in the presence of an acid. They are commonly used in conjunction with the natural tanning extracts. Their use is reported to result in (1) an economy of the time required for tanning, (2) a satisfactory leather of light color, and (3) a reduction in the amount of natural extract required.

The total production in 1922 was 1,910,519 pounds, with sales amounting to 1,981,588 pounds, valued at $103,598. Production for 1923 shows an increase.

The combined production of synthetic phenolic resins and synthetic tanning materials in 1923 was 9,763,685 pounds, with sales amounting to 10,068,431 pounds and valued at $5,816,590.

STATISTICS OF PRODUCTION

TABLE 12.—*Production and sales of dyes and other finished coal-tar products, 1923*

The number in the first column identifies the dyes according to the 1914 edition of the Schultz tables. The second column gives the common name of the product. The numbers in the third column refer to the numbered alphabetical list of manufacturers printed on page 195. An X signifies that a manufacturer did not consent to the publication of his identification number in connection therewith. A blank in the fourth and fifth columns indicates that the sales figures can not be published without revealing information in regard to the output of individual firms. A blank in the seventh column indicates that the production of the corresponding dye in the United States can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the total.]

Schultz No.	Common name	Manufacturers' identification number according to list on p. 195	Sales			Production
			Quantity	Value	Average price per pound	
	Total finished coal-tar products.		*Pounds* 115,297,586	$65,898,177	$0.57	*Pounds* 122,950,171
	NITROSO DYES					
4	Naphthol green	6, 64				
	NITRO DYES					
7	Naphthol yellow S	32, 91, 96, 184	47,578	45,135	.95	44,508
8	Pigment chlorine	190				
	STILBENE DYES					
9	Direct yellow R	6, 7, 32, 39, 70, 80, 131, 137, 146, 147.	506,785	412,343	.81	569,910
10	Stilbene yellow	63, 70, 80				
11	Chloramine orange G	6, 7, 70, 80, 131, 137	144,421	175,494	1.22	147,422
	PYRAZOLONE DYES					
19	Fast light yellow	7, 63, 88, 131, 133, 151.				112,752
22	Xylene yellow	39, 151				
23	Tartrazine	27, 88, 131, 151, 183, 184, 205.	712,329	618,163	.87	735,608
29	Eriochrome red B	63, 133				
	AZO DYES					
	MONOAZO DYES					
32	Butter yellow	7, 32, 45, 91, 137, X	96,191	48,259	.50	101,249
33	Chrysoidine Y	6, 7, 12, 27, 32, 45, 63, 88, 91, 131.	569,596	332,768	.58	545,836
34	Chrysoidine R	6, 12, 32, 45, 63, 64, 88, 91, 131.	167,524	95,767	.57	152,370
35	Sudan G	45				
36	Sudan I	32, 91, 131, 137, X	32,115	27,899	.87	36,668
37	Croceine orange	6, 39, 107, 131	38,819	22,521	.58	
38	Orange G	27, 32, 63, 131, 167	123,950	73,178	.59	119,639
40	Chromotrope 2R	131, 133, 137, X	10,736	13,238	1.23	29,444
41	Fast acid fuchsine B	7, 32, 36, 46, 131, 137	20,879	13,474	.65	22,082
42	Amino naphthol red G	6, 7, 32, 39, 63, 80, 88, 131, 146.	145,149	102,913	.71	159,889
45	Brilliant lake red R	121				
48	Alizarin yellow G	7, 27, 39, 46, 63, 88, 131, 140, X, X, X.	348,043	182,499	.52	395,361
56	Paranitraniline red	X				
57	Chromotrope 2B	137				
58	Alizarin yellow R	6, 7, 27, 39, 46, 63, 88, 137, 167, X, X.	175,417	106,387	.61	168,777
61	Victoria violet	6, 39, 80, 131, 137, 146, X.	136,155	142,766	1.05	172,925
64	Lanafuchsine	137, 167				
65	Azo coralline	80, 88				

TABLE 12.—*Production and sales of dyes and other finished coal-tar products, 1923*—Continued

Schultz No.	Common name	Manufacturers' identification number according to list on p. 195	Sales			Production
			Quantity	Value	Average price per pound	
	AZO DYES—Continued					
	MONOAZO DYES—continued		Pounds			Pounds
66	Amino naphthol red 6B	6, 7, 32, 63, 80, 88, 131, 137.	112,915	$88,402	$0.78	
67	Chromotrope 6B	131, 137, 146	97,209	78,336	.81	
68	Spirit yellow R	32, 45, 131, X	46,735	44,208	.95	
72	Pigment orange R	190				
73	Helio fast red	X				
76	Sudan II	7, 32, 45, 63, 91, 131	41,915	44,768	1.07	
82	Ponceau 2R	6, 7, 27, 32, 39, 63, 131, 137, 167.	419,579	241,334	.58	
88	Acid anthracene brown R	63				
89	Metachrome brown B	6, 27, 63, 131, X	323,871	223,353	.69	
93	Sudan R	137				
94	Azo eosine C	137				
102	Diamond flavine G	25, 88, 133, X	14,890	12,021	.81	
105	Sudan brown	7				
106	Autol red RLP	32				
112	Bordeaux B	6, 7, 27, 32, 39, 45, 88, 131, 137, 167.	215,552	156,208	.73	
114	Chromotrope 10B	7, 137				
117	Erica 2 GN	70, 147				
119	Diamine rose	19, 70, 131, 147				
121	Erica B	70, 137				
134	Metanil yellow	7, 39, 63, 64, 88, 91, 131.	412,255	330,349	.80	
137	Acid yellow G	7, 63, 64, 131	4,453	3,875	.87	
139	Orange IV	184				
141	Azo yellow	7, 32, 63, 64, 88, 131, 184.	137,892	145,779	1.06	
143	Tropaeoline	91				
144	Orange I	32				
145	Orange II	6, 7, 27, 32, 39, 45, 63, 91, 131, 135, 146, 167.	1,442,413	526,736	.37	
147	Azo fuchsine 6B	63				
151	Orange R	7, 63, 91, 131	77,157	32,436	.42	
152	Permanent red 4B	39, 63, 121	48,233	126,039	2.61	
153	Lake red C	121, 167, 170	143,932	196,583	1.37	
154	Palatine chrome brown	25, 46, 107, 131, 133	35,411	38,581	1.09	
155	Acid alizarin garnet R	6, 25, 131				
156	Palatine chrome violet	25, 63, 88, 131, 133	7,801	8,502	1.09	
157	Diamond black PV	88, 131				
158	Chrome brown RR	46				
159	Acid alizarin black R	25				
160	Fast brown N	88				
161	Fast red A	7, 27, 32, 39, 63, 91, 131, 137, 140, 167,	221,263	171,915	.78	
163	Azo rubine	6, 7, 32, 39, 45, 63, 88, 107, 131, 137,	518,908	440,008	.85	
164	Fast red VR	6, 39, 131, 133, 137	155,405	197,888	1.27	
166	Fast red E	6				
167	Croceine scarlet 3 BX	39				
168	Amaranth	32, 39, 63, 131, 137, 167.	50,863	36,263	.71	
169	Cochineal red	27, 32, 63, 131, 167				
173	Lithol red R	28, 39, 66, 167, 170, 190, X.	273,570	315,614	1.15	
177	Mordant yellow	6, 39, 131	60,728	39,208	.65	
178	Crumpsall yellow	131				
179	Lake bordeaux B	190				
180	Eriochrome blueblack B	39, 96, 107, 131, 133				
181	Salicine black U	6, 7, 19, 25, 32, 39, 45, 63, 88, 131, 133, 137, 167, X	1,290,536	686,266	.53	
183	Eriochrome black T	25, 39, 63, 96, 133				
184	Eriochrome black A	39, 63, 88, 131, 133	118,143	92,374	.78	
186	Lanacyl violet B	63				
188	Sulphon acid blue R	6, 39, 63, 88, 131, 133	282,023	240,261	.85	
189	Sulphon acid blue B	131				
190	Alkali brown	147				
193	Stanley red	147				
194	Thiazine red R	70, 137				
195	Rosophenine SG	70, 147, X	14,869	21,636	1.82	

roduction and sales of dyes and other finished coal-tar products, 1923—Continued

nmon name	Manufacturers' identification number according to list on p. 195	Sales			Production
		Quantity	Value	Average price per pound	
ES—(Continued)					
DYES—continued		*Pounds*			*Pounds*
red G	80, 88, 147	1,076	$1,575	$1.46	
	19, 137, 147	706	1,234	1.75	2,183
D	199				
hrome red B	7, 32, 39, 63, 131, 137, 190, X.	91,816	99,677	.99	106,833
IAZO DYES					
la F	88				
brown	6, 7, 63, 80, 91, 131, 140, 146, X, X.	160,944	128,076	.80	169,340
n	7, 32, 131, X				25,116
lack 10B	6, 7, 25, 32, 39, 46, 63, 88, 107, 131, 137, 140, 146, 167, X.	2,377,290	1,694,148	.71	2,568,458
lack	39				
le acid brown	63				
	32				
eroceine	32, 63, 88, 131, 167				
R	32				
iolet	64				
3G	63				
	7, 32, 39, 45, 91, 131, 137, X	37,263	34,576	.98	41,421
B	7, 88				
G	39, 64				
B	6, 39, 64, 131, 133	45,183	52,551	1.16	51,845
ay G	137				
let G	64, 91				
	7, 64, 131, 133	33,701	44,781	1.33	54,730
ange G	64, 133				
yanine G	6, 63, 88, 131, 133	426,779	388,284	.91	461,141
ack 10B	6, 131, 133	28,657	26,600	.93	28,325
ion black F	25, 88				
yanine black	63, 88, 131				
amine black D	6, 63, 88, 137	11,673	10,026	.86	
Croceine 9B	32				
en	63				
black	6, 52, 63, 107, 131	176,662	153,960	.87	
green	6, 63, 88	13,184	14,748	1.12	12,122
scarlet	63, 131, 137				
brown	7, 12 32, 52, 63, 70, 88, 91, 131	280,677	120,457	.60	177,419
brown 2R	6, 7, 12, 32, 39, 45, 52, 63, 64, 88, 91, 131, X	698,317	486,241	.58	672,544
hrome black	133				
rin black SN	133				
lant yellow	6				
yellow	63				
pink 2BL	63				
ow	6, 7, 63, 131, 137	71,654	97,078	1.36	54,347
enine G	7, 63, 70, 131, 137	413,494	423,902	1.03	447,963
	7, 63, 107, 131, 137, 140	594,068	297,725	.50	599,548
A	131				
inth G	6, 7, 32, 52, 88, 131, 137, 140	157,659	168,633	1.07	144,321
ine	39, X				
carlet	63, 131, X	32,184	51,684	1.61	36,095
n violet B	39, 131, 137	42,604	56,282	1.18	39,605
e R	147				
iolet N	7, 25, 32, 39, 63, 107, 131, 137, 140, X	41,269	57,477	1.39	41,177
lack R O	7				
red	63				
lack BHN	6, 7, 25, 32, 39, 63, 107, 131, 137, 140, 146	866,800	634,140	.73	905,491
nine R	131				

TABLE 12.—*Production and sales of dyes and other finished coal-tar prod*
1923—Continued

Schultz No.	Common name	Manufacturers' identification number according to list on p. 195	Sales			Prod
			Quantity	Value	Average price per pound	
	DISAZO DYES—continued		*Pounds*			*Pou*
337	Benzo blue 2B	6, 7, 25, 32, 39, 45, 46, 131, 137, 140, 146, X, X	883, 882	$360, 164	$0.41	1,9
340	Benzo orange R	39, 46, 63, 88, 137	82, 891	66, 235	.80	
341	Crumpsall direct fast red R	X				
342	Chrysamine G	7, 39, 46, 63, 131, X	19, 184	21, 996	1.15	
343	Diamine fast red F	6, 7, 25, 32, 39, 63, 70, 107, 131, 137, 140	75, 967	90, 945	1.20	
344	Diamine brown	6, 7, 25, 32, 39, 63, 70, 80, 107, 131, 137, 140	169, 148	160, 209	.95	
349	Diamine brown B	140, X				
351	Cresotine yellow G	52, 131				
355	Anthracene red	137				
362	Oxydiamine orange	64, 131				
363	Benzopurpurine 4B	7, 32, 39, 63, 107, 131, 137.	413, 250	368, 823	.89	
365	Benzopurpurine B	6, 52				
378	Trisulphon blue R	137				
382	Azo mauve B	131				
384	Chicago blue 2R	63				
385	Oxamine blue 4R	131				
386	Benzo blue BX	39, 131, 137	41, 249	35, 373	.86	
391	Benzo blue 3B	7, 12, 32, 39, 45, 107, 131, 137.	174, 141	94, 072	.54	
392	Toluylene orange G	131, 137				
393	Diphenyl brown 3 GN	45				
400	Acid anthracene red	X				
405	Benzopurpurine 10B	7, 63, 131, 137	25, 964	43, 280	1.67	
410	Benzazurine G	63, 131, 137				
415	Dianil blue G	137				
419	Chicago blue RW	7, 39, 63, 131, 137	95, 427	143, 970	1.51	
421	Oxamine blue B	131				
424	Chicago blue 6B	7, 63, 131, 137				
426	Benzamine pure blue	6, 7, 39, 63, 131, 137, 146.	225, 615	218, 222	.97	
	TRIAZO DYES					
436	Columbia black	6, 7, 39, 46, 63, 131	169, 970	161, 005	.95	
441	Diazo blue black RS	131, 137				
442	Direct black V	137				
456	Benzo fast blue	63				
462	Direct deep black EW	6, 7, 32, 39, 46, 63, 131, 137, 140, X	6, 720, 905	2, 875, 928	.43	6,9
463	Erie direct black RX	6, 7, 39, 46, 63, 131, 137.	349, 659	180, 559	.52	
464	Erie direct green ET	7, 46, 52, 131	51, 493	43, 755	.85	
470	Chloramine green B	137				
471	Chloramine blue 3G	137				
473	Diamine black HW	7, 140, 147	4, 098	5, 002	1.22	
474	Oxamine green B	6, 7, 32, 39, 52, 63, 70, 131, 137.	306, 023	250, 980	.82	
475	Oxamine green G	6, 12, 32, 39, 63, 137, 140, X, X	84, 896	70, 526	.83	
476	Benzamine brown 3 GO	6, 7, 32, 39, 45, 52, 70, 88, 131, 133, 137, 140, X.	931, 242	596, 306	.64	
477	Congo brown G	7, 63, 88, 131, 137, 147, X.	207, 793	194, 688	.94	
480	Congo brown R	63				
	TETRAKISAZO DYES					
485	Benzo brown G	32, 52, 63, 17 1' 40	154, 208	120, 914	.78	
487	Benzo brown B	70, 137				
	All other azo dyes		1, 948, 206	2, 287, 417	1.17	2,2
	Total azo dyes		30, 292, 072	21, 597, 247	.71	32,8
	DIPHENYLMETHANE DYES					
493	Auramine	63, 77, 106, 131	393, 189	677, 192	1.72	

TABLE 12.—*Production and sales of dyes and other finished coal-tar products, 1923*—Continued

Schultz No.	Common name	Manufacturers' identification number according to list on p. 195	Sales			Production
			Quantity	Value	Average price per pound	
	TRIPHENYLMETHANE DYES		*Pounds*			*Pounds*
495	Malachite green	63, 106, 131	178,271	$285,585	$1.60	183,684
499	Brilliant green	106, 131				
502	Guinea green	36, 63, 131				
503	Brilliant milling green B	131				
505	Light green	63				
506	Erioglaucine	131				
511	Para fuchsine	131				
512	Magenta (or fuchsine)	39, 55, 91, 98, 131, 157, X.	75,051	156,081	2.08	87,717
513	New fuchsine O	131				
515	Methyl violet	32, 55, 63, 91, 104, 131, 135, X.	563,579	702,515	1.25	578,183
516	Crystal violet	25, 63				
517	Methyl violet 5B	131				
521	Aniline blue	39, 91, 98				
524	Acid magenta	39, 98				
528	Fast violet 10B	36, 63, 137	21,413	46,063	2.15	15,541
530	Acid violet	36, 39, 63, 80, 131, 146	137,887	255,733	1.86	148,258
531	Eriocyanine	131				
536	Alkali blue	39, 55, 98, 131, 135, 157, 167, X.	157,877	377,527	2.39	154,845
537	Methyl blue for silk	91				
538	Methyl blue for cotton	98				
539	Soluble blue	39, 55, 98, 131	10,694	36,907	3.45	15,366
543	Patent blue V	131				
545	Patent blue A	36, 131				
548	Acid violet 6 BN	63				
555	Aurine	63, 155				
558	Victoria blue R	63				
	Total triphenylmethane dyes		1,539,140	2,677,418	1.74	1,608,653
	DIPHENYL-NAPHTHYLMETHANE DYES					
559	Victoria blue B	25, 63				
562	Fast acid blue	63				
564	Naphthalene green V	131				
566	Wool green S	25, 63, 80, 88, 131, 146	382,427	317,370	.83	375,858
	XANTHONE DYES					
571	Rhodamine 6G	63				
573	Rhodamine B	63				
580	Fast acid violet B	63				
582	Fast acid violet A 2R	63				
585	Uranine	7, 56, 91, 135	957	2,978	3.11	2,398
587	Eosine	7, 56, 91, 135	100,745	185,814	1.84	80,648
590	Eosine BN	7				
592	Erythrosine B	7, 56, 63, 91, 135	8,506	41,973	4.94	7,250
593	Phloxine P	56				
596	Phloxine	63, 91				
597	Rose bengale B	63, 91				
599	Gallein	208				
600	Coerulein	208				
	Total xanthone dyes		267,511	555,071	2.08	254,639
	ACRIDINE DYES					
606	Phosphine	63, 91, 131, 151	86,500	166,667	1.93	122,853
	QUINOLINE DYES					
613	Quinoline yellow	26, 131, 137				
	THIOBENZENYL DYES					
615	Thioflavine S	147				
616	Primuline	19, 70, 80, 131, 137, 147, X.	224,784	157,912	.70	227,824
617	Columbia yellow	19, 70, 80, 131, 137, 147.	215,810	252,347	1.17	188,595

TABLE 12.—*Production and sales of dyes and other finished coal-tar products, 1923*—Continued

Schultz No.	Common name	Manufacturers' identification number according to list on p. 195	Sales			Production
			Quantity	Value	Average price per pound	
	OXAZINE AND THIAZINE DYES		*Pounds*			*Pounds*
622	Delphine blue B	7, 46, 131				
626	Gallocyanine	7, 27, 46, 131, 206	82,513	$138,279	$1.68	[illegible]
631	Chromocyanine V	131				
636	Prune pure	7				
649	Cotton blue or Meldola's blue	7, 46, 107, 131	56,116	93,787	1.67	[illegible]
659	Methylene blue	27, 46, 131, 204	410,608	691,113	1.47	[illegible]
660	Methylene green	131				
667	Brilliant alizarin blue	80, 88				
	AZINE DYES					
672	Azo carmine	63				
679	Safranine	63, 131, 155	126,151	183,365	1.45	[illegible]
681	New fast gray	27, 137				
683	Safranine MN	131				
687	Rosolane O	63				
697	Induline (spirit-soluble)	19, 32, 39, 88, 91, 131	20,929	19,435	.93	[illegible]
698	Nigrosine (spirit-soluble)	19, 27, 32, 88, 91, 131, 133.	284,235	148,006	.52	[illegible]
699	Induline (soluble in water)	19, 39, 88, 91, 131	89,500	74,130	.83	[illegible]
700	Nigrosine (soluble in water)	19, 27, 88, 91, 131, 133.	1,374,363	633,742	.46	[illegible]
	SULPHUR DYES					
720	Sulphur black	12, 46, 63, 88, 94, 107, 131.	15,212,142	3,017,207	.20	[illegible]
	Sulphur blue	12, 18, 46, 63, 88, 107, 131, 137, X, X, X.	1,213,085	610,171	.50	[illegible]
	Sulphur brown	7, 12, 39, 46, 47, 56, 63, 88, 107, 131, 165, 173, 187, 206, X, X.	2,049,475	806,684	.39	[illegible]
	Sulphur green	6, 12, 46, 63, 107, 131, 137, 165, 206	164,344	140,651	.86	[illegible]
	Sulphur maroon	6, 12, 46, 63, 107, 206	387,158	297,104	.77	[illegible]
	Sulphur olive	19, 46, 47, 63, 70, 88, 137, 173, 206.	168,356	85,687	.51	[illegible]
	Sulphur orange	46, 88, 173, 206	47,083	23,707	.49	[illegible]
	Sulphur tan	6, 39, 47, 88, 165, 206, X.	202,824	97,997	.48	[illegible]
	Sulphur yellow	12, 46, 63, 87, 88, 131, 137, 165, 173, X, X.	561,461	408,771	.73	[illegible]
	Total sulphur dyes		20,005,928	5,487,379	.27	[illegible]
	CARBAZOLE DYES					
748	Hydron blue R, G	63, 107				
	ANTHRAQUINONE DYES					
761	Indanthrene golden orange R	63				
763	Indanthrene dark blue BO	63, 122, 137	25,130	50,167	2.00	[illegible]
765	Indanthrene black and green B	63, 122, 137	20,673	42,805	2.07	[illegible]
767	Indanthrene violet RR	63				
768	Indanthrene violet B	63				
778	Alizarin	18, 131				
779	Alizarin orange	18, 131				
780	Alizarin red S	18				
782	Alizarin brown	46, 63, 65, 131, 184, 190, 208, X.	134,941	167,294	1.24	[illegible]
784	Alizarin SX	131				
785	Alizarin GI	18, 137				
789	Anthracene blue WR	65, 84, 102, 131, 135	54,506	117,198	2.15	[illegible]
800	Anthracene blue	84				
838	Indanthrene blue RS	63, 137				
840	Indanthrene blue 3G	63				

BLE 12.—*Production and sales of dyes and other finished coal-tar products, 1923*—Continued

ultz o.	Common name	Manufacturers' identification number according to list on p. 195	Sales			Production
			Quantity	Value	Average price per pound	
	ANTHRAQUINONE DYES—continued		*Pounds*			*Pounds*
842	Indanthrene blue GCD	63, 137				
843	Indanthrene blue GC	137				
849	Indanthrene yellow	63, 137				
858	Alizarin saphirol B	88, 102, 131	272,471	$952,216	$3.50	309,124
862	Alizarin blue black	36, 65				
865	Alizarin cyanine green	36				
867	Indanthrene brown B	137				
	Total anthraquinone dyes		1,952,601	3,438,677	1.76	2,123,966
	INDIGO AND ITS DERIVATIVES					
874	Indigo, synthetic (20 per cent)	62, 63, 131	25,492,201	5,884,712	.23	28,347,259
876	Indigo, white	46				
877	Indigo extract	7, 14, 63, 113, 131, X, X.	328,440	190,493	.58	330,810
880	Indigo RB	62				
881	Ciba blue 2B, 2BD	62				
882	Ciba blue G	62				
883	Indigo 6B	62				
	ANILINE BLACK GROUP					
923	Ursol	82, 167, X				
	FOOD DYES					
7	Naphthol yellow S	X				
23	Tartrazine	7, 27, 131, 198, X	53,801	188,608	3.51	58,117
83	Ponceau 3R	7, 131, X	17,694	96,068	5.43	16,098
144	Orange I	7, 27, 131, X	38,739	116,593	3.01	
168	Amaranth	7, 27, 107, 131, 198, X.	89,821	279,847	3.12	82,450
502	Guinea green B	131, 198				
505	Light green SF (yellowish)	131, 198				
515	Methyl violet	131				
592	Erythrosine	7, 131, X				
877	Indigo disulfonic acid	7, 131, X				6,498
	Yellow AB	7, 66, 91, 131, 175	7,168	18,852	2.63	6,523
	Yellow OB	7, 66, 91, 131, 175	9,108	24,682	2.71	7,586
	Total food dyes		228,686	860,077	3.76	230,343
	PHOTOCHEMICAL DYES					
	Orthochrome T	68				
	Pinacyanole	68				
	All other dyes	63, 147				
	Bacteriological, biological stains and indicators, and research chemicals	41, 54, 68, 86, 99, 111, 131, 154, 172, 179, X.				
	Total dyes		86,567,446	47,223,161	.55	93,667,524

DYES NOT CLASSIFIED BY SCHULTZ NUMBER

Manufacturers were requested to report separately, in terms of ir familiar pre-war designations, the production of dyes not ssified by Schultz. The following table is a list of such dyes,

together with certain new dyes of American development for which there are no foreign equivalents:

Name of dye	Manufacturers' identification number according to list on page 195	Name of dye	Manufacturers' identification number according to list on page 195
Acid anthracene brown A, B, RH	88	Direct black GX	
Acid anthracene orange GR	80	Direct blue 3RX	
Acid anthracene yellow GR	80	Direct blue 4R	
Acid chrome brown R	80	Direct brown R	
Acid black BA	6	Direct brown GR, G2R, G3R	
Acid brown	X	Direct dark brown B	
Acid claret B	167	Direct dark green	
Acid naphthol blue black	39	Direct fast blue B, R	
Acid navy blue	140	Direct fast light blue FF	
Acid red OTH	137	Direct fast orange R	
Acid yellow HM	91	Direct fast orange RCL, 2R	
Alizarin black	208	Direct fast yellow 6GL extra	
Alizarin black GS paste	65	Direct fast yellow 2R, 2RCL	
Alizarin blue IS	208	Direct navy R	
Alizarin brown 3R	167	Direct salmon red	
Alizarin brown 5R	208	Direct violet B conc. extra	
Alizarin green	X	Direct violet R conc	
Alizarin serge blue GS	65	Dyelene chromate brown EBN	
Alizarin yellow 4G	7	Empire coralline	
Anthracene chrome black DNN	36	Empire fast violet AA	
Anthranol chrome brown FB	133	Fast acid violet ERR extra	
Anthranol chrome green 3G	133	Fast chrome brown R	
Anthranol chrome yellow DF extra	133	Furol DB	
Anthranol chrome yellow 8S	133	Helio bordeaux BL	
Anthrene blue GX	137	Hydron pink FF	
Anthrene jade green	137	Indanthrene black BCS	
Artificial silk black G	63	Indanthrene blue BCS, 20 per cent paste	
Atlantamine blue	12	Indomine navy blue 2BM	
Atlantamine green	12	Jet black APX	
Atlantamine red	12	Marine blue SW	
Atlantamine yellow	12	Midland vat cadet blue	
Atlantole wood blue	12	Midland vat blue MB	
Azo dark green	137	Naphthanil red for printing	
Azo eosine 2B	137	Navy blue T	
Azo fast violet 2R	131	Nerol black 2B	
Azo violet BS, 2B	6	Oil brown I-2494	
Azo wool blue G, R	80	Oil brown	
Benzo black LM	133	Oil brown R	
Benzo chrome brown G, R, 2R	7	Oil brown H-8808	
Benzo chrome dark brown	7	Oil orange	
Benzo fast black L, LM [1]	6, 63, 80	Oil orange Y-293	
Benzo fast orange S	63	Oil red	
Benzo fast pink 2B	80	Oil red C, S	
Benzo fast scarlet 4BA	63	Oil scarlet T	
Benzo rhoduline red B	63	Oil yellow PHW, OB	
Brilliant crocein FL	63	Oil soluble yellow	
Bromo fluorescein	56, 135	Oxamine copper blue RRX	
Chloramine fast orange GR, GG, G3G	80	Oxydiamiogen OB	
Chrome black	27, 46	Pacco direct fast gray BL	
Chrome black special	25	Palachrome maroon	
Chrome black A, T, BC, RX	X	Palaside brown B	
Chrome green	6	Paranol direct orange 9L	
Chrome green B	39, 70	Permanent red R	
Chrome green G	39	Pluto orange G	
Chrome green SW	25, X	Pontachrome brown R, SW	
Chrome green SE, SW	25	Pontachrome yellow SW	
Chrome red SW	X	Pontamine diazo black H	
Chrome yellow	6, 27, 137	Rosanthrene A, R	
Chrome yellow 8S	88	Rosanthrene orange	
Cindiazo blue B	39	Scarlet 2RG	
Copper blue 2RX	6	Silk black 4BF	
Cotton brown R	6	Solamine blue FF	
Developed black 2BN, G	137	Sudan orange	
Diamine bordeaux B	63, 131	Sudan AT, AX, T	
Diamine catechine	63	Sulphon acid black N2	
Diamine catechine 3O	131	Victoria fast violet 2R	
Diamond green	80	Wool black B	
Diamond red BHA	88	Wool blue black	
Dianol dark blue B	63	Wool blue G	
Diazo bordeaux 7B	63	Wool fast violet 2R	
Diazo fast red 5BL	63	Zambesi black A	
Diazo fast red 7BL	63	Zambesi black D	
Diazo indigo blue M	63	Zambesi black PC	
Diazo seal brown	X	Zambesi black V, VX [2]	

[1] Sales of Benzo fast black LM and L are 102,872 pounds, valued at $192,452.

[2] Sales of Zambezi black V and VX are 361,326 pounds valued at $470,320 and the production was 433,192 pounds.

Production and sales of dyes and other coal-tar products, 1923

Common name	Manufacturers' identification number according to list on page 195	Sales			Production
		Quantity	Value	Unit value	
COLOR LAKES					
		Pounds			*Pounds*
Black lakes	6, 37, 46, 50, 67, 92, 167, 168, 203, X.	565,097	$61,271	$0.11	587,344
Blue lakes	11, 22, 28, 37, 46, 59, 63, 67, 73, 90, 92, 100, 109, 112, 119, 162, 167, 168, 169, 170, 177, 188, 189, 190, X, X, X, X, X, X.	766,492	377,572	.49	770,751
Brown lakes	28, 37, 46, 59, 73, 100, 112, 168, 169, 177, 188, 189, 203, X.	222,950	20,502	.09	214,012
Eosine lakes	11, 22, 28, 59, 67, 73, 92, 100, 119, 162, 167, 168, 169, 170, 177, 188, 189, 190, 203, X, X, X, X, X, X, X, X.	486,864	335,093	.69	529,962
Green lakes	11, 22, 28, 37, 59, 63, 67, 73, 85, 90, 92, 100, 109, 119, 162, 167, 168, 169, 170, 177, 189, X, X, X, X, X, X, X.	626,403	181,481	.29	666,180
Lithol red lakes	11, 22, 28, 37, 46, 59, 63, 73, 90, 92, 100, 105, 112, 119, 162, 167, 168, 169, 170, 177, 188, 189, 190, 203, X, X, X, X, X, X.	706,479	495,101	.70	741,556
Maroon lakes	11, 22, 28, 37, 59, 63, 67, 92, 100, 105, 115, 116, 119, 123, 162, 167, 168, 169, 170, 177, 188, 189, 190, 199, 203, X, X, X, X.	1,229,610	392,308	.32	1,266,216
Orange lakes	11, 22, 28, 37, 59, 63, 67, 73, 92, 100, 109, 112, 119, 162, 167, 168, 169, 170, 177, 188, 189, 203, X, X, X, X, X, X, X, X.	585,292	150,548	.26	602,331
Para red lakes	11, 22, 28, 46, 50, 59, 63, 67, 92, 100, 105, 112, 115, 116, 119, 167, 168, 170, 177, 188, 189, 190, 199, 203, X, X, X, X, X.	3,196,651	1,018,090	.32	3,379,767
Red lakes	11, 22, 28, 37, 46, 50, 59, 63, 67, 73, 90, 92, 100, 105, 109, 112, 116, 119, 123, 162, 167, 168, 169, 170, 177, 188, 189, 190, 199, 203, X, X, X, X, X, X, X.	1,644,597	992,224	.60	1,689,027
Scarlet lakes	11, 22, 28, 37, 59, 63, 67, 73, 90, 92, 100, 105, 115, 116, 119, 123, 162, 167, 168, 169, 170, 177, 188, 190, 199, X, X, X, X, X, X, X.	1,047,206	393,442	.38	1,076,419
Violet lakes	11, 22, 28, 37, 46, 59, 63, 67, 73, 90, 92, 100, 109, 119, 162, 167, 168, 169, 170, 177, 188, 189, 190, 203, X, X, X, X, X, X.	387,176	378,876	.98	388,001

Production and sales of dyes and other coal-tar products—Continued

Common name	Manufacturers' identification number according to list on page 195	Sales			Production
		Quantity	Value	Unit value	
MEDICINALS—continued		*Pounds*			*Pounds*
Neoarsphenamine	1, 60, 108, 126, 153, 174.	3,035	$1,039,121	$339.08	3,365
Neocinchophen. (*See* Tolysin.)					
Novaspirin (Methylenecitrylsalicylic acid).	17				
Peralga (1-diethylbarbarturic-2-amidopyrene).	5				
Phenacaine (ethenyl-p-diethoxy-diphenylamidine hydrochloride.	126				
Phenolphthalein	150, X				
Phenolsulfonates (calcium, sodium, zinc, etc.).	1, 118, 124, 153	196,173	61,914	.32	208,902
Phenolsulfonephthalein	86				
Phenylthiocarbamide	X				
Procaine (p-amino benzoyl-diethyl aminoethanol).	1, 126				
Proflavine (3:6 diamino acridine sulfate).	1, 131				
Proposote (creosote derivative).	X				
Resorcinol monoacetate	68				
Salicaine (salicyl alcohol)	27				
Salicylates, miscellaneous	153				
Salol (phenyl salicylate)	93, 124, 128	89,206	71,467	.80	98,597
Salophen (Acetylparaminophenol salicylate).	17				
Scarlet red	131				
Silver arsphenamine	126				
Sodium salicylate	62, 93, 124, 128, X	410,840	165,759	.40	416,382
Strontium salicylate	93				
Sulfoarsphenamine	120, 126, 153, 174	119	65,676	550.97	164
Tolysin- neocincophen (p-methoarsphenyl-cinchoninic ethyl ester).	1–27				
Trypan blue	131				
Total medicinals		2,995,448	4,720,253	1.58	3,273,085
FLAVORS					
Coumarin (synthetic)	62, 75, 103, 128, X, X.	104,200	389,799	3.74	114,682
Ethyl benzoate	44, 75, 79, 141, 178, 191, 194, X.	1,041	1,611	1.55	980
Ethyl cinnamate	75, 79, 103, 178, 194				
Ethyl salicylate	75, 79, 178, 191, 194, X.				
Methyl cinnamate	75, 79, 103, 178, X, X.	815	3,725	4.57	796
Methyl salicylate	62, 79, 93, 103, 124, 178, X, X.	940,795	544,426	.58	967,505
Saccharin	93, X, X	363,048	661,913	1.82	340,944
Vanillin (*see* Part IV)	X				
Total flavors		1,442,387	1,780,313	1.23	1,458,024
PERFUME MATERIALS					
Acetophenone	75, 79, 103, 178, 192	238	855	3.59	277
Amyl benzoate	79				
Amyl salicylate	75, 79, 93, 103, 129, 178, 192, X.	11,562	16,569	1.43	9,217
Anbepine (Anisic aldehyde)	75, 78, 103, 178, 192	2,742	9,506	3.49	3,045
Benzophenone	75				
Benzyl acetate	75, 79, 103, 129, 178, 192, X.	21,179	27,635	1.31	21,937
Benzyl alcohol	108, 129, 178, 192, X	4,101	4,976	1.21	12,080
Benzyl benzoate	75, 79, 103, 124, 129, 178, 192.	26,372	37,545	1.42	29,185
Benzyl butyrate	79, 103				
Benzyl cinnamate	75, 79, 103, 178, 192				
Benzyl formate	178, X				
Benzyl propionate	79, 178, X				
Benzyl salicylate	178				
Benzylidine acetone	129, 178				

Production and sales of dyes and other coal-tar products—Continued

Common name	Manufacturers' identification number according to list on page 193	Sales			Production
		Quantity	Value	Unit value	
PERFUME MATERIALS—con.		*Pounds*			*Pounds*
Benzylphenyl acetate	178				
Bromstyrol	75, 79, 103, 178, 192	148	$718	$4.85	134
Butyl salicylate	79				
Cinnamic acid	79, 103, 178, 192				1,30
Cinnamic alcohol	178				
Cinnamic aldehyde	75, 78, 103, 178, 192	1,536	5,000	3.26	1,42
p-Cresyl acetate	75, 129				
p-Cresylphenyl acetate	75				
Dibenzyl ketone	75				
Diethyl phthalate	20, 75, 79, 103, 129, 178, 191, 192, X, X.	1,170,939	592,039	.51	1,230,20
Dimethyl acetophenone	178				
Dimethyl anthranilate	75, 178				
Dimethylbenzyl carbinol	75				
Dimethyl hydroquinone	75				
Dimethyl resorcinol	178				
Diphenylmethane	79, 178, 192				33
Diphenyloxide	178, X				
Ethyl fumarate	191				
Ethylphenyl acetate	178				
Ethylphenyl ether	79				
Hydratropic aldehyde	178				
Indol	75				
Isobutyl anthranilate	75				
Isobutyl indol	75				
Isobutylphenyl acetate	75, 129				
Isobutyl salicylate	178				
Methyl acetophenone	178				
Methyl anisate	178				
Methyl anthranilate	20, 62, 75, 103, 178, 186, 192.	1,564	5,247	3.36	2,59
Methyl benzoate	44, 75, 79, 141, 178, X.	172	254	1.48	2
p-Methylbenzyl acetate	75				
p-Methylbenzyl anthranilate	75				
Methyl p-cresol	178				
Methyl p-cresyl ether	79				
Methyl guaiacol	178				
Methylphenyl acetate	75, 79, 103, 129, 178, 192, X.	1,014	5,120	5.05	1,20
Methylphenyl ether	79				
Methylphenyl glycidate	75				
Methyl-p-tolyl ketone	75				
b-Naphthyl anthranilate	75				
Nerolin (b-naphthol ethyl ether).	75, 79, 178				
Nonyl anthranilate	75				
Phenylacetic acid	79				
Phenylacetic aldehyde	75, 103, 178, 192	453	4,615	10.19	45
Phenylethyl acetate	75, 103, 178, 194				
Phenylethyl alcohol	62, 75, 103, 178, 192, X.	799	5,167	6.47	1,28
Phenylethyl benzoate	178				
Phenylethyl formate	178				
Phenylethyl phenyl acetate	178				
Phenylethyl propionate	178				
Phenylglycol acetate	75				
Phenylpropyl alcohol	194				
Phenylvinylethylenemethyl ketone.	178				
Santalylphenyl acetate	75				
Skatol (methyl indol)	75, 178				
Sodium cinnamate	79				
Tetrahydroparamethyl quinoline.	75				
Yara yara (b-naphthol methyl ether).	79, 178				
All other perfumes	X				
Total perfumes		1,275,432	789,431	.62	1,302,60
Synthetic tanning materials	107, 207, X	10,068,431	5,816,590	.58	9,705,98
Synthetic phenolic resins	16, X				

Employees and Rates of Pay

The number of employees receiving specified rates of pay on cember 18, 1923, or on the nearest representative date for which information could be obtained, as reported by 181 of the 206 as manufacturing coal-tar products in 1923, is contained in ble 13. The 25 firms not reporting either conducted a business which coal-tar products were not the primary articles of manu-ture or they did not have separately organized departments deal-therewith.

According to the Bureau of the Census, the number of firms en-ed in the manufacture of coal-tar colors and other products in 4 was 7, with 528 employees, divided as follows: Salaried em-yees, 130; wage earners (average number), 398. In 1923 there were firms reporting 14,841 employees. This represents a decrease ,418 from 1922, which in turn is an increase of 2,967 over 1921.

The chemists and technically trained men in 1923 constituted 12.7 cent of all employees, as compared with 10.8 per cent in 1922. the 1,882 men of this class in 1923, 28.27 per cent received $50 or re but under $75 per week, 23.32 per cent received $75 per week over, 9.83 per cent received $45 or more but under $50 per week. those without technical training, 21.99 per cent received $30 but er $35 per week, 19.97 per cent received $25 but under $30, 9 per cent received $35 but under $40, 15.58 per cent received but under $25. In general, the wages of 1923 for chemists and nically trained men showed a small decrease from those of 1922, le for all men without technical training there was a large increase ng the same period. Table 13 compares specified rates of pay of nically trained men with those of men not having such training. ong the technically trained men there was an increase of 0.51 cent in the pay of the group receiving $75 per week and over and nall decrease in the groups receiving $35 to $40, $40 to $45, $45 to and $50 to $75. Of men without technical training there was verage increase of about 25 per cent in the weekly wages of the e classes receiving $25 to $30, $30 to $35, and $35 to $40 per week. s previously stated, the dye and coal-tar chemical industry has bably a larger proportion of technically trained men than will be nd in any other manufacturing industry in the United States.

LE 13.—*Employees and rates of pay, dye and coal-tar chemical industry, 1923*

Wages per week	Number of employees at each specified wage engaged in manufacturing operations			Percentage receiving each specified wage		Percentage receiving each specified wage or more	
	Chemists and technically trained men	Men without technical training	All employees	Chemists and technically trained men	Men without technical training	Chemists and technically trained men	Men without technical training
r $10	2	74	76	0.11	0.57	100.00	100.00
t under $15	16	348	364	0.85	2.69	99.89	99.43
t under $20	37	773	810	1.97	5.96	99.04	96.74
t under $25	74	2,018	2,092	3.93	15.58	97.07	90.78
t under $30	110	2,588	2,698	5.84	19.97	93.14	75.20
t under $35	173	2,850	3,023	9.19	21.99	87.30	55.23
t under $40	178	2,123	2,301	9.46	16.39	78.11	33.24
t under $45	136	1,108	1,244	7.23	8.55	68.65	16.85
t under $50	185	643	828	9.83	4.96	61.42	8.30
t under $75	532	414	946	28.27	3.19	51.59	3.34
d over	439	20	459	23.32	0.15	23.32	0.15
Total	1,882	12,959	14,841	100.00	100.00		

TABLE 13.—*Employees and rates of pay, dye and coal-tar chemical industry, 1923*—Continued

Wages per week	Percentage receiving each specified wage					
	Chemists and technically trained men			Men without technical training		
	1923	1922	Increased percentage	1923	1922	Increased percentage
Under $10	100.00	100.00	----------	100.00	100.00	----------
$10 but under $15	99.89	99.83	0.06	99.43	99.33	.10
$15 but under $20	99.04	99.09	[1].05	96.74	95.92	.82
$20 but under $25	97.07	97.10	[1].03	90.78	75.89	14.89
$25 but under $30	93.14	92.94	.20	75.20	46.73	28.47
$30 but under $35	87.30	84.22	3.08	55.23	24.60	30.63
$35 but under $40	78.11	78.41	[1].30	33.24	11.62	21.62
$40 but under $45	68.65	71.86	[1] 3.21	16.85	5.61	11.24
$45 but under $50	61.42	62.01	[1].59	8.30	2.29	6.01
$50 but under $75	51.59	52.74	[1] 1.15	3.34	.96	2.38
$75 and over	23.32	22.81	.51	0.13	.06	.07

[1] Decrease.

RESEARCH WORK

Of the 206 firms engaged in 1923 in the manufacture of dyes and other coal-tar chemicals, 65 had separately organized research laboratories for the solution of technical problems and for the development or discovery of new products. The total cost of the research work carried on in these laboratories, together with that done in laboratories not separately organized for research, was $2,085,901. This figure is about the same as the amount ($2,172,508), expended in 1922 for this purpose. For the first time the Tariff Commission's census of 1923 has obtained not only the total cost of the research work carried on by the companies, but the net cost of that work chargeable to coal-tar products alone, amounting in 1923 to $1,900,281. The cited figures are doubtless an understatement of the real cost of experimental work, since they do not include, in all cases, the cost of research forming a part of manufacturing operations and not charged against research on the books of the companies.

The value of the finished coal-tar products produced in 1923 was about $65,000,000, not including crudes or intermediates. The foregoing figures give some indication of the large expenditure for research work considered necessary if the industry is to be self-contained and kept on a stable, efficient basis of operation. The coal-tar chemical industry must not only keep in view, as in the past, the development of products already known but must always be alert to the discovery of new products if it is to maintain a competitive position in the world's markets.

PART III

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1923

PART III

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1923

INTRODUCTORY

Since 1919 the United States Tariff Commission has compiled a detailed census of dye imports similar to that published by the Department of Commerce under the title "Artificial Dyestuffs used in the United States (fiscal year 1913 and 1914)," commonly known as the "Norton import census."

The commission first compiled such statistics for use in the administration of section 501, title 5, of the tariff act of September 8, 1916, which made the continuance of specific duties on coal-tar products, after September 8, 1921, dependent upon the production in the United States of as much as 60 per cent in value of the consumption of these products. As the information was found to be of direct value to manufacturers, consumers, and importers, as well as to the commission itself, in considering the tariff aspects of the coal-tar chemical industry, the annual census of imports has been continued.

Through cooperation with the Treasury Department the invoices covering dye importations through the various ports of the United States, with the exception of New York, have been sent to the commission for tabulation. In the year 1923, the monthly import statistics for the port of New York were compiled and published under a cooperative arrangement between the respective Chemical Divisions of the Department of Commerce and the Tariff Commission. In obtaining the final 1923 figures shown in this report, the monthly data previously available for the port of New York were rechecked and the statistics for the warehouse withdrawals completed for that year. Data were also obtained for imports through ports other than New York.

In tabulating the statistics the commission has followed in the main the "Schultz Farbstoff Tabellen," which are based upon the chemical composition of the dye. Certain types were also identified according to the "Colour Index" issued by the British Society of Dyers and Colourists, the Norton census, and other sources of information in the files of the Tariff Commission. Dyes identified by Norton as "a, b, and c" classes under a given Schultz number are listed under that number (without subdivision) except in a few instances in which they had been incorrectly designated. Dyes included under these "a, b, and c" classes are not always chemically identical with the original Schultz types. Such dyes as could not be identified by Schultz numbers are classified by the ordinary method of application, as follows; Acid, basic, direct, lake and spirit-soluble,

mordant and chrome, sulphur, and vat.[1] In many cases the classification of a dye by its method of application is arbitrary, as certain colors may be applied by either of two methods. A few dyes could not be classified either by the Schultz tables or by the method of application, and are therefore listed under the heading "Unclassified and unidentified dyes."

The rate of exchange used in converting foreign invoice values to United States currency was either the rate given on the invoice or, in comparatively few cases, the exchange value published by the Treasury Department for the month in which consular certification occurred.

Summary of Imports of Dyes in 1923

The total imports of coal-tar dyes during the year 1923 were 3,098,193 pounds, valued at $3,151,363, as compared with 3,982,631 pounds, valued at $5,243,257, for 1922.

Of the total imports in 1923, 47 per cent came from Germany, 28 per cent from Switzerland, 12 per cent from Italy, 6 per cent from France, 4 per cent from England, and 3 per cent from other countries.

Table 16 shows the quantity and the value (when publishable) of individual dyes imported in 1923. Table 14 is a summary of dyes imported from 1920 to 1923, inclusive, classified according to their method of application. Table 15 gives the quantity of each of the leading dyes imported in 1923, compared with corresponding imports for the years 1922, 1921, and 1914.

Swiss dyes.—The coal-tar dyes imported into this country from Europe fall largely into two groups, (1) dyes shipped directly from foreign factories, chiefly German and Swiss products, and (2) reparation dyes delivered by Germany in payment to the Allies and subsequently resold and shipped to the United States and other countries. In addition, there is a small percentage of dye imports originating with jobbers in the different foreign countries. Swiss dyes constitute 28 per cent, or 867,494 pounds, of total imports during 1923.

The prominent position maintained in the United States by Swiss dyes calls for a brief review of Switzerland's export trade. In 1913 the total quantity of Swiss dyes exported was 19,458,902 pounds, valued at $5,549,752; in 1920, the year of maximum export, 23,739,794 pounds, valued at $35,411,115, were exported.

Prior to the war the value of Swiss exports of dyes was slightly more than 10 per cent of the total value of Germany's dye exports. The proportion of Swiss exports to Germany at that time is significant, averaging approximately one-fifth of the total. Since the war, however, exports of Swiss dyes to Germany have been small.

From a broad economic viewpoint the Swiss dye industry is not self-contained or economically independent, on account of lack of coal and coke and their products, as well as other raw materials. Prior to the war many of its essential raw materials were imported from Germany. Since the war the situation has been materially changed, raw materials having become available from Great Britain, France, the United States, Czechoslovakia, and, more recently, again from Germany. Dye producers in Switzerland to-day enjoy an open competitive market wherein to purchase their raw materials.

[1] In nearly every case vat dyes have been reduced to a single strength.

In 1922 domestic imports of dyes were larger than in 1923, totaling the former year 3,982,631 pounds, with an invoice value of 243,257. Of these, Swiss dyes constitute 39 per cent by quantity 1 41 per cent by value. Most of the remainder were of German nufacture. In 1923 Swiss dyes, amounting to about one-half of above quantity, represented 28 per cent of the total imports. twithstanding this decrease, the Swiss dye manufacturers secured nuch greater share of the domestic import trade than would have n anticipated from the size of the Swiss industry, as compared h that of Germany. The recent increases reported in the sell- prices of German dyes should favor increased exports of Swiss s. The reduction in the ad valorem duty on September 22, 1924, m 60 to 45 per cent will also tend to increase domestic imports of higher-cost special types, such as are manufactured by the Swiss lustry.

The prominence of Swiss dyes in the domestic market is not irely a recent development, as the United States received about -fifth of the total Swiss exports in 1914.

During the period of licensed control of dye imports under the ading With the Enemy Act and up to the passage of the Dye and emical Control Act on May 27, 1921, licenses were refused for the portation of competitive types of enemy origin, but were granted for mpetitive types of nonenemy origin. This resulted in an extensive e of Swiss dyes in many of the textile mills of this country. Buyers nsequently became well acquainted with Swiss products, and ir use continued to a considerable extent even after the German es were placed on equal terms with respect to import facilities. The Swiss have an excellent variety of dyes, consisting mainly of ose of relatively high cost and special type, for which the demand comparatively small. Indigo, however, is an important bulk lor produced in Switzerland. An efficient manufacturing and tributing organization and the advantage of long experience favor e development of the Swiss industry.

An examination by class of application of the 66 leading dyes ported into the United States in 1923 shows that 23 of them were olly or largely of Swiss manufacture. These include both com- titive and noncompetitive products, as regards American manu- turers. The leading Swiss dyes imported in 1923 are as follows:

Acid:
- Xylene light yellow.
- Erioglaucine.
- Eriocyanine.
- Polar red.
- Polar yellow.

Mordant and chrome:
- Gallamine blue.
- Alizarin light blue B.
- Omega chrome brown.
- Erio chrome flavine A.

Direct:
- Trisulphon browns.
- Diazamine blue.
- Diphenyl brown BN.
- Chlorantine fast brown.
- Chlorantine fast orange.

Vat:
- Ciba violet B.
- Ciba scarlet.
- Ciba bordeaux B.

Basic:
- Phosphine.
- Rhodamine B.
- Rhodamine 6G.

Sulphur:
- Eclipse brown.
- Thional brown G.
- Pyrogene blue.
- Thional yellow.

Dyes imported from Italy.—In addition to the imports of dyes originating in plants of foreign manufacturers, a significant portion of domestic imports was made up of German reparation dyes resold by the countries receiving them and purchased by American importers. In 1923, 12 per cent, by quantity, of total domestic imports of dyes came from Italy, and examination of the individual imports shows that they include the faster and special types, apparently of German origin. They furthermore include many types, such as the anthraquinone vat dyes, which are not produced in Italy. It may be assumed, therefore, that these dyes were delivered to Italy in payment for reparation and later resold to consumers in the United States and other countries. Official Italian statistics of imports for 1922 show that 1,634,270 pounds of German reparation dyes were received in that year and 2,156,760 pounds in the first nine months of 1923.

From the 50 per cent stocks of dyes[2] on hand in the German plants as of August 15, 1919, (totaling 10,353,057 kilos, or 22,824,349 pounds), subject to the Reparation Commission's option, 5,200 tons were withdrawn for immediate delivery. Of these Italy received 700 tons, the United States and Great Britain each 1,500 tons, France 1,000 tons, and Belgium 500 tons. The remainder of the stock was distributed on the basis of the pre-war consumption, taking into account new conditions and home production. In this way Italy received 7 per cent of the Indanthrene blue GCD compared with the United States 55 per cent, and 13 per cent of the other vat dyes, as against 39 per cent for the United States. The total dye deliveries from the stocks on hand to the allied and associated Governments were 9,889,650 kilos (21,802,722 pounds).

During the period of United States participation the option for the delivery of 25 per cent of the German daily production gave no GCD blue to Italy and only 9 per cent of the other vat dyes, while the United States received 60 per cent of GCD blue and 42 per cent of other vats.

After the cessation of deliveries to the United States, the percentages accorded to Italy, France, and Belgium showed a conspicuous increase of GCD blue; Italy received 25 per cent, and of other vat dyes Italy and France each received 20 per cent, Belgium 10 per cent, and Great Britain 50 per cent.

According to the report of the Reparation Commission, Italy had received up to December 31, 1923, 6,274,601 kilos (13,832,985 pounds) of all dyes out of a total delivery by Germany of 25,583,390 kilos (56,401,142 pounds). Italy ranked second to Great Britain, the latter receiving 7,664,993 kilos (16,898,244 pounds) of all dyes. These reparation figures are of interest in any consideration of the possible imports of reparation dyes from Italy and France in 1924, especially in view of the renewed deliveries of the I. G. to the different allied countries.

[2] "Report on the Works of the Reparation Commission from 1920-1922, printed and published by His Majesty's Stationery Offices."

IMPORT STATISTICS.

TABLE 14.—*Summary of dyes imported for consumption, classified by method of application, 1920–1923.*

Class	1923		1922	
	Pounds	Per cent of total	Pounds	Per cent of total
Acid	544,048	17.56	601,395	15.10
Vat:				
(a) Indigo			505	.01
(b) Vat (other than indigo)	1,207,554	38.98	1,548,519	38.89
Total	1,207,554	38.98	1,549,024	38.90
Mordant and chrome:				
(a) Alizarin	27,716	.89	27,086	.68
(b) Mordant and chrome	425,699	13.74	689,704	17.32
Total	453,415	14.63	716,790	18.00
Direct	527,014	17.01	671,621	16.86
Sulphur	114,023	3.68	194,883	4.89
Basic	210,896	6.81	155,084	3.89
Spirit-soluble and color-lake	23,213	.75	76,853	1.93
Unidentified, unclassified special	18,030	.58	16,981	.43
Total	3,098,193	100.00	3,982,631	100.00

Class	1921		1920	
	Pounds	Per cent of total	Pounds	Per cent of total
Acid	1,455,823	34.24	733,405	21.55
Vat:				
(a) Indigo	70,975	1.66	171,101	5.04
(b) Vat (other than indigo)	1,045,370	24.59	761,363	22.37
Total	1,116,345	26.25	932,464	27.41
Mordant and chrome:				
(a) Alizarin	136,283	3.58	73,252	2.16
(b) Mordant and chrome	559,678	12.78	636,230	18.71
Total	695,961	16.36	709,482	20.87
Direct	537,664	12.64	571,581	16.80
Sulphur	220,938	5.20	229,140	6.73
Basic	163,527	3.84	192,163	5.64
Spirit-soluble and color-lake	43,553	1.02	17,527	.51
Unindentified, unclassified special	19,100	.45	16,820	.49
Total	4,252,911	100.00	3,402,582	100.00

TABLE 15.—*Dyes of each class according to method of application, imported in largest quantity during the calendar year 1923, compared with imports in 1922, 1921, and fiscal year 1914*

Schultz No.	Class and name of dye	1923	1922	1921	1914
	ACID DYES	*Pounds*	*Pounds*	*Pounds*	*Pounds*
543	Patent blue	66,279	49,136	42,708	196,228
	Alizarin rubinol 3G, 5G, GW, R	48,826	26,457	[3]	[3]
22	Xylene light yellow	46,886	12,937	60,422	23,673
506	Erioglaucine	38,254	25,852	16,004	95,328
220	Palatine black	33,500	11,436	14,859	298,274
546	Cyanol	19,979	20,658	14,271	46,653
531	Eriocyanine	19,202	14,808	16,808	25,081
523	Fast green	17,190	52,498	22,619	14,567
265	Sulphocyanine black	15,543	14,858	615	69,580
	Polar red 3B, G, R, RS	15,031	14,926	2,579	2,452
	Polar yellow, 2G, 5G	13,453	2,998		762
564	Naphthalene green	13,328	19,298	23,026	32,144
545	Patent blue A	11,872	3,436	16,170	63,744
503	Neptune green	8,825	1,661	7,462	40,958
	Brilliant milling blue	8,540	872	2,175	9,960
	VAT DYES				
849	Indanthrene yellow (single strength)	87,946	15,507	40,609	12,483
761	Indanthrene golden orange R (single strength)	79,717	78,145	56,390	33,495
842	Indanthrene blue GCD (single strength)	70,546	16,802	201,835	476,984
760	Indanthrene golden orange G (single strength)	67,265	73,305	33,423	21,402
901	Ciba violet B (single strength)	64,517	131,661	21,987	25,839
	Hydron pink FB, FF (single strength)	55,428	20,250		
869	Algol brown B (single strength)	55,081	16,778	6,040	1,398
	Helindone pink B, R, RN (single strength)	47,771	40,668		
765	Indanthrene green B (single strength)	40,420	[2] 57,344	[2] 6,032	[2] 72,251
838	Indanthrene blue RS (single strength)	38,235	39,999	28,998	187,279
907	Ciba scarlet (single strength)	37,524	33,246	10,695	22,270
919	Ciba bordeaux B (single strength)	35,714	33,621	4,625	659
840	Indanthrene blue 3G (single strength)	31,748	24,992	19,715	8,129
759	Anthraflavone G (single strength)	27,721	20,594	10,594	7,149
819	Algol red FF, R (single strength)	25,228	14,825	14,489	2,232
	MORDANT AND CHROME DYES				
862	Alizarin blue black	70,917	22,277	43,277	14,238
637	Gallamine blue	29,244	29,237	15,129	2,236
778	Alizarin (synthetic)	27,716	27,086	[4] 136,283	202,302
858	Alizarin saphirol B	26,615	46,596	28,696	77,140
780	Alizarin red	25,017	25,872	15,565	41,859
854	Alizarin viridine	17,217	25,910	9,499	
865	Alizarin direct green G	16,241	11,669	36,534	2,994
782	Alizarin brown	14,531	4,596	20,700	114,286
	Acid alizarin gray G	13,526	7,555	2,818	
785	Alizarin GL, RG	12,528	6,300	18,266	69,651
856	Alizarin astrol	11,224	8,155	24,657	
	Omega chrome brown G, PB	11,511	8,570	5,486	
	Eriochrome flavine A	10,713	12,293	110	
774	Alizarin black	10,521	7,343	26,524	205,545
779	Alizarin orange	8,444	15,523	3,834	14,229
	DIRECT DYES				
273	Diaminogene blue	88,778	22,420	19,182	6,389
274	Diaminogene B	32,903	8,527	7,864	313,629
449	Trisulphon brown B	26,980	45,697	38,558	16,791
358	Diphenyl red	21,160	33,945	4,036	14,305
	Diamine fast orange EG, ER, R	17,793	8,719	6,281	17,267
348	Diphenyl brown BN	17,534	2,598		13,471
456	Benzo fast blue	17,036	6,997	3,768	109,650
457	Trisulphon brown GG	16,150	37,648	22,872	7,502
392	Toluylene orange	14,382	36,920	523	67,022
	Chlorantine fast brown 3GL, RL	13,558	7,715	4,389	
	Zambesi black D, V	13,000	3,000	1,732	629,339
207	Diphenyl fast brown GNC	10,126	9,797	969	967
319	Diamine scarlet	9,950	14,137	12,399	61,173
	Diazo pure blue B, 3G, 3GL	9,026	14,967	6,892	6,379
	SULPHUR DYES				
	Thionol brown	28,802	48,750	20,622	
	Cross dye green B	26,242	27,834	51,074	100
	Eclipse brown	10,000	35,991	21,248	4,200
747	Thional brown G	9,228			110
726	Pyrogene blue	8,929	24,251	11,718	10,994
	Thional yellow	7,306		17,704	

[1] Included in Schultz No. 856.
[2] Figures for Indanthrene black included.
[3] Figures incomplete
[4] Figures from Department of Commerce.

TABLE 15.—*Dyes of each class according to method of application, imported in largest quantity during the calendar year 1923, compared with imports in 1922, 1921, and fiscal year 1914*—Continued

Schultz No.	Class and name of dye	1923	1922	1921	1914
	BASIC DYES	*Pounds*	*Pounds*	*Pounds*	*Pounds*
606	Phosphine	42,176	51,711	21,325	168,225
571	Rhodamine 6G	31,242	13,545	10,069	37,515
573	Rhodamine B	29,083	5,077	10,890	59,354
618	Thioflavine T	20,283	6,765	7,297	35,224
608	Euchrysine	9,483	3,476	872	15,403
603	Acridine orange	9,349	711	1,613	2,336
663	New methylene blue	6,343	2,060	4,329	30,392
661	Thionine blue	6,129	2,746	421	18,618
500	Setopaline	5,853	2,824	----------	923

KEY TO ABBREVIATIONS USED IN TABLE 16

1. THE SIX LEADING GERMAN COMPANIES

A ..... Actien-Gesellschaft für Anilin-Fabrikation, Berlin. Founded 1873.
B ..... Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By ..... Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
C ..... Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K ..... Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870.
M ..... Farbwerke, vormals Meister Lucius & Brüning, Höchst-on-the-Main. Founded 1862.

2. THE SMALLER GERMAN COMPANIES

BK ..... Leipziger Anilinfabrik Beyer & Kegel, Fürstenberg, near Leipzig. Founded 1882.
CG ..... Chemikalienwerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1881.
CJ ..... Carl Jäger G. m. b. H., Anilinfarbenfabrik, Düsseldorf. Founded 1823.
GrE ..... Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L ..... Farbwerk Mühlheim, vormals A. Leonhardt & Co., Mühlheim-on-the-Main. Founded 1879.
tM ..... Chemische Fabriken, formals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD ..... Wülfing, Dahl & Co., A. G., Barmen. Founded 1842.
A-S Co ... Arzberger & Schöpff & Co., Eisenach.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES

FA ..... Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF ..... Niederländische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
LG ..... Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
P ..... Société Anonyme des Matières colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL

DH ..... Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G ..... Anilinfarben-und-Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I ..... Gesellschaft für chemische Industrie. Founded 1885.
S ..... Chemische Fabrik, vormals Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES

Bro..... Brotherton and Co. (Ltd.), City Chambers, Leeds.
B. A. C... British Alizarine Co. (Ltd.), Manchester.
B. D..... British Dyestuffs Corporation (Ltd.), London.
Cl. Co ... The Clayton Aniline Co. (Ltd.), Clayton, Manchester.
C. V..... The Colne Vale Dye and Chemical Co. (Ltd.), Milnsbridge, Huddersfield.
Hol..... L. B. Holliday and Co. (Ltd.), Huddersfield.
Scot..... Scottish Dyes (Ltd.), Grangemouth.

TABLE 16.—*Dyes imported into the United States, 1923*

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
	Total		*Pounds* 3,098,192	$3,151,363
6	Martius yellow		400	
	Aniline yellow	B		
9	Direct yellow		2,102	
	Sun yellow G	S		
11	Chloramine orange		32	
	Chloramine orange G	By		
14	Diphenyl chrysoine		4,409	
	Diphenyl chrysoine GC	G		
19	Fast light yellow		6,211	5,13
	Fast light yellow	WD		
	Fast light yellow 2G	By		
	Fast light yellow 2G	WD		
	Fast light yellow 3G	By		
	Fast light yellow 3G	WD		
	Fast light yellow R	WD		
21	Pigment chrome yellow		100	
	Pigment chrome yellow L paste	M		
22	Xylene light yellow		46,886	37,90
	Xylene light yellow 2G conc. 75 per cent	S		
	Xylene light yellow 2G conc. 100 per cent	S		
	Xylene light yellow R conc	S		
25	Dianil yellow 3G	M	100	
28	Hansa yellow G—			
	Hansa yellow G paste	M	4,081	
	Hansa yellow G pdr	M	1,900	
34	Chrysoidine R		55	
	Chrysoidine RL	B		
38	Orange G		254	
	Orange 2G	C		
	Orange 2G	WD		
48	Alizarin yellow G		1,389	49
	Alizarin yellow 2G	M		
	Alizarin yellow 2G	I		
	Alizarin yellow 5G	I		
	Alizarin yellow GD	S		
56	Autol red		994	
	Nitrosamine red paste	B		
58	Alizarin yellow R		75	
	Alizarin yellow R paste	I		
	Ultra orange R	S		
61	Victoria violet		350	
	Azo wool blue SE	C		
	Victoria violet 4BS conc	S		
63	Azo acid blue		210	
	Azo acid blue B conc	S		
65	Azo coralline		4	
	Azo coralline L	WD		
73	Helio fast red		851	
	Sitara fast red RL	tM		
74	Tannin orange R		400	
	Tannin orange R pdr	C		
81	Brilliant cochineal		101	
	Palatine scarlet A	B		
84	Azo chromine		55	
	Azo chromine NR paste	G		
88	Acid anthracene brown		7,810	7,72
	Acid anthracene brown PG	By		
	Acid anthracene brown R	By		
	Acid anthracene brown RH	By		
93	Sudan R		25	
	Pigment purple A pdr	M		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
100	Eosamine B	A	7,501	
117	Erica 2GN	A	260	
118	Geranine		447	
	Geranine G	By		
	Brilliant geranine B	By		
119	Diamine rose		400	
	Diamine rose GD	C		
121	Erica B		3,298	$5,866
	Cotton pink B extra	Q		
	Cotton pink BN	B		
	Erica B extra	A		
122	Erica G		345	
	Cotton pink GN	B		
124	Diazine green		10	
	Janus green B	M		
125	Diazine black		80	
	Black JD	B		
	Janus black I	M		
126	Indoine blue R		10	
	Naphthindone BB	C		
129	Chromazone red		1,323	
	Chromazone red, new conc	G		
140	Curcumeine		5,991	5,843
	Chromocitronine R	DH		
	Chromocitronine 3R	DH		
	Chromocitronine V	DH		
	Jasmine, highly conc	G		
141	Azo yellow		100	
	Indian yellow FF	C		
152	Permanent red 4B		2,240	
	Permanent red 4B extra pdr	A		
154	Palatine chrome brown		1,459	1,419
	Palatine chrome brown GGX	B		
	Palatine chrome brown RX	B		
	Palatine chrome brown W	B		
	Palatine chrome brown WNRTX	B		
158	Chrome brown RR		1,054	
	Chrome brown R	G		
	Chrome brown RVV	G		
159	Acid alizarin black		3,920	
	Acid alizarin black R	M		
160	Naphthylamine brown	B	6	
161	Fast red		170	
	Fast red AV	B		
	Fast red AVX	B		
168	Amaranth		500	
	Amaranth B	C		
	Amaranth B conc	C		
175	Acid ponceau		220	
	Acid ponceau E	G		
177	Mordant yellow		700	588
	Milling yellow GA	A		
	Milling yellow 3G	A		
	Milling yellow O	C		
180	Eriochrome blue black		2,205	
	Eriochrome blue black G	G		
182	Brilliant sulphon red		7,414	7,438
	Brilliant sulphon red B	S		
	Brilliant sulphon red 5B	S		
	Fast sulphon violet 5BS	S		
184	Eriochrome black A		4,409	
	Eriochrome black E	G		
193	Stanley red	Cl Co	300	
198	Thiazol yellow		25	
	Thiazol yellow 3G	By		
206	Diphenyl catechine G		750	
	Diphenyl catechine G supra	G		
207	Diphenyl fast brown G		10,126	
	Diphenyl fast brown GNC	G		
217	Agalma black 10B		150	
	Naphthylamine black 4B	By		
220	Palatine black		33,500	18,425
	Wool black 6B	A		
	Wool black GRF	A		
	Wool jet black 3B	A		
221	Anthracene acid brown G	C	453	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
222	Janus yellow		760	
	Janus yellow G	M		
	Yellow IG	M		
	Yellow JG	M		
236	Wool red B		115	
	Fast bordeaux B	BK		
240	Janus red B		700	$1,32
	Janus red B	M		
	Red IB	M		
	Red JB	M		
250	Milling orange	WD	551	
256	Sulphon black 3B		200	
	Azo cyanine GR	K		
257	Sulphon cyanine		333	
	Cloth fast blue R	I		
260	Eriochrome verdon S	G	2,205	
265	Sulphonyanine black		15,543	$ 11
	Acid milling black	G		
	Acid milling black B 50 per cent	G		
	Acid milling black B 100 per cent	G		
266	Naphthylamine black		708	
	Naphthylamine black 6B	By		
273	Diaminogene blue		88,778	$3,5
	Diaminogene blue NA	C		
	Diaminogene blue NBB	C		
	Diazamine blue NA	CN		
	Diazamine blue BR	S		
	Diazamine blue RR	S		
	Naphthogene blue RR	A		
274	Diaminogene B		32,903	26,97
	Black extra	C		
	Diaminogene extra	C		
	Diaminogene black extra	C		
	Diazo indigo blue BR	By		
	Diazo indigo blue 2RL	By		
	Zambesi pure blue 4BG	A		
276	Diamond green		99	
	Diamond green B	By		
277	Anthracene acid black		119	
	Anthracene acid black ST	C		
	Acid chrome black STC	By		
279	Benzo fast scarlet		5,190	7,67
	Benzo fast scarlet 5BS	By		
	Benzo fast scarlet 8BS	By		
	Benzo fast scarlet GS	By		
	Direct fast scarlet SE	I		
283	Bismark brown		2,429	1,23
	Bismark brown	WD		
	Excelsior brown	WD		
	Leather brown A	C		
	Vesuvine extra	B		
	Vesuvine 3R	M		
288	Palatine chrome black		179	
	Acid alizarin black SE pdr	M		
293	Milling red		100	
	Milling red G	C		
294	Fast mordant yellow		11	
	Fast mordant yellow G pdr	B		
296	Cotton yellow		3,329	1,43
	Benzo fast yellow RL	By		
	Cotton yellow	B		
	Cotton yellow GI	B		
	Cotton yellow GX	B		
	Diamine fast yellow 3G	C		
297	Benzo fast pink 2BL	By	121	
303	Paper yellow		1,501	
	Brilliant yellow	By		
	Brilliant yellow conc	S		
306	Pyramine orange 3G	B	4,300	
308	Diazo black OT	By	501	
313	Congo rubine	A	105	
319	Diamine scarlet		9,950	$ 9,95
	Chloramine red 3B	S		
	Diamine brilliant bordeaux R	C		
	Diamine scarlet B	C		
	Diamine scarlet 3B	C		
	Triazol red 3B	GrE		
322	Trisulphon violet B	S	500	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
325	Columbia blue R	A	10	
326	Oxydiamine violet		633	
	Benzo violet O	By		
	Naphthamine violet BE	K		
330	Zambesi brown		50	
	Zambesi brown 4R	A		
332	Benzo fast red		1,042	$1,335
	Benzo fast red 8BL	By		
333	Diamine black		5	
	Oxamine black BHN extra	B		
338	Naphthamine blue		1,981	
	Naphthamine blue JEF	K		
339	Brilliant orange		3,821	2,656
	Diamine orange B	C		
340	Benzo orange R		50	
	Benzo fast orange WS	By		
342	Chrysamine		5,002	
	Chrysamine K	S		
	Chrysamine KS	S		
343	Diamine fast red		200	
	Diamine fast red 8BL	C		
346	Oxamine red		900	
	Oxamine red X	B		
	Oxamine red 3BX	B		
348	Diphenyl brown		17,534	
	Diphenyl brown BBNC	G		
	Diphenyl brown GS	G		
349	Diamine brown B	C	451	
354	Direct gray R paste	G	2,172	
358	Diphenyl red		21,160	17,614
	Aceto purpurine 8B	A		
	Chloramine red 8BS	By		
	Toluylene red	GrE		
	Toluylene red OO	GrE		
360	Pyramine orange R		6,895	
	Ignamine (Pyramine) orange R	B		
364	Diazo brilliant black		782	
	Diazo brilliant black B	By		
366	Delta purpurine		441	
	Delta purpurine 5B	By		
370	Brilliant congo		330	
	Brilliant congo R	By		
373	Congo orange		2,020	
	Congo orange R	A		
	Congo orange R	By		
386	Benzo blue		900	
	Chloramine blue BXR conc	S		
387	Columbia blue G	A	25	
392	Toluylene orange		14,382	13,101
	Direct fast orange K	I		
	Pyrazol orange G conc	S		
	Toluylene fast orange GL	By		
405	Benzopurpurine 10B	S	100	
411	Benzoazurine 3G	By	22	
424	Chicago blue 6B		7,431	
	Brilliant benzo blue 6B	By		
	Chloramine sky blue FF conc	S		
426	Benzo pure blue conc	By	11	
435	Janus brown		50	
	Janus brown B	M		
436	Columbia black		50	
	Patent dianil black FF conc	M		
448	Diamine bronze		800	
	Diamine bronze G	C		
449	Trisulphon brown		26,980	39,210
	Diphenyl brown TB conc	G		
	Trisulphon brown B	S		
	Trisulphon brown B conc	S		
456	Benzo fast blue		17,036	31,338
	Benzo fast blue 2GL	By		
	Benzo fast blue 4GL	By		
	Benzo light blue 2GL	By		
	Benzo light blue 4GL	By		
457	Trisulphon brown GG		16,150	19,495
	Trisulphon brown GG	S		
	Trisulphon brown GG conc. 50 per cent	S		
	Trisulphon brown GG conc. 70 per cent	S		
472	Chloramine blue HW		100	
	Chloramine blue HW	S		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
475	Oxamine green G		250	
	Naphthamine green AN	K		
476	Benzamine brown 3GO		100	
	Dianil chrome brown G	M		
485	Benzo brown D3G	By	6	
493	Auramine		3,944	
	Auramine N conc	S		
	Auramine OO	G		
494	Auramine G		3,037	
	Auramine G	G		
	Auramine G	I		
496	Setoglaucine		3,498	$2,102
	Setoglaucine 753	G		
	Setoglaucine 753, 55 per cent	G		
	Setoglaucine 753, 100 per cent	G		
497	Victoria green	B	5	
498	Turquoise blue BB, G	By	4	
500	Setopaline		5,853	
	Setopaline conc. 707	G		
501	Brilliant glacier blue	I	110	
503	Neptune green		8,825	10,902
	Brilliant acid green 6B	By		
	Brilliant milling green B	C		
	Erioviridine B supra	G		
	Guinea fast green B	A		
	Night green A	tM		
	Patent green AGL	M		
505	Light green (yellowish)		468	470
	Acid green GG extra	By		
	Light green SF yellowish	B		
	Light green SF yellowish XX	B		
506	Erioglaucine		38,254	74,116
	Brilliant acid blue EG	By		
	Erioglaucine	G		
	Erioglaucine A	G		
	Erioglaucine AB	G		
	Erioglaucine AP	G		
	Erioglaucine EP	G		
	Erioglaucine supra conc	G		
507	Xylene blue VS		6,104	
	Xylene blue VS conc	S		
512	Magenta		148	
	Diamond magenta I, small crystals	B		
	Magenta, small crystals	M		
514	Red violet		220	
	Violet 4RN	I		
515	Methyl violet		690	1,003
	Methyl violet crystals	S		
	Methyl violet NFB	B		
	Methyl violet 300 XE	P		
516	Crystal violet		3,738	6,256
	Crystal violet crystals	tM		
	Crystal violet extra conc	K		
	Crystal violet extra	B		
	Crystal violet pdr	WD		
	Crystal violet O	M		
	Crystal violet 5BO	S		
518	Ethyl purple		3,852	
	Ethyl violet	B		
	Ethyl violet 6B	GrE		
522	Victoria blue 4R		1,350	
	Victoria blue 4R	I		
	Victoria blue 4R highly conc	B		
523	Fast green		17,190	18,918
	Fast green bluish	By		
	Fast green extra bluish	By		
	Fast green extra bluish conc	By		
524	Acid magenta		577	
	Acid fuchsine S conc	A		
	Acid magenta	C		
527	Acid violet 4BN		6,305	11,065
	Acid violet 4BNS conc	S		
	Acid violet 6BNOO	By		
	Acid violet 7BN	By		
528	Fast acid violet 10B		5,862	11,940
	Fast acid violet 10 B	By		
	Kiton fast violet 10 B	I		
	Kiton fast violet 10 B conc	I		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

tz	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
10	Acid violet		197	
	Acid violet 3BNO	B		
	Acid violet 6BNG	G		
	Acid violet C 10B	B		
	Formyl violet S 4B	C		
	Acid violet 4 BS	WD		
	Acid violet 10B	C		
11	Eriocyanine		19,202	
	Eriocyanine A	G		
	Eriocyanine AC	G		
12	Alkali violet		142	$420
	Alkali violet CA	C		
	Alkali violet 4BNOO	B		
	Alkali violet 6BOO	B		
14	Acid violet 7B		25	
	Acid violet 7B conc	B		
15	Methyl alkali blue		195	
	Methyl alkali blue	M		
	Methyl alkali blue pdr	GrE		
16	Alkali blue		100	
	Alkali blue 3R conc	tM		
17	Methyl blue for silk		7,058	20,523
	Methyl Lyons blue	G		
	Methyl silk blue new	G		
	Pure blue 2G	tM		
39	Soluble blue		1,165	2,392
	Cotton blue No. 2 conc	M		
	Silk blue BSIC	GrE		
	Soluble blue T	B		
	Water blue	A		
41	Brilliant dianil blue 6G		440	
	Brilliant cotton blue 6B	K		
	Direct brilliant blue 8B	I		
43	Patent blue		66,279	50,586
	Brilliant acid blue V	By		
	Carmine blue V	I		
	Neptune blue BGX	B		
	Patent blue V	A		
	Patent blue V	M		
	Patent marine blue LE	M		
	Tetra cyanol V	C		
44	Cyanine B		440	
	Cyanine B	M		
45	Patent blue A		11,872	10,646
	Brilliant acid blue A	By		
	Brilliant acid blue F	By		
	Brilliant acid blue FF	By		
	Neptune blue BXX	B		
	Patent blue A	A		
	Patent blue A	M		
	Tetracyanol A	C		
46	Cyanol		19,979	23,576
	Cyanol extra	C		
	Cyanol extra	Q		
	Cyanol extra A	Q		
	Cyanol FF	C		
	Glaucol FF	L		
48	Acid violet 6BN		957	4,836
	Acid violet 6BNOO	B		
	Acid violet 6BS	WD		
	Acid violet GENG	G		
50	Chrome bordeaux		55	
	Chrome bordeaux B	DH		
53	Eriochrome cyanine		999	
	Eriochrome cyanine RC	G		
54	Chrome azurol		1,601	
	Chrome azurol S conc	G		
	Chrome azurol SXT	G		
55	Aurine		560	
	Aurine 100 per cent	Q		
57	Chrome violet		550	
	Chrome violet CG	DH		
58	Victoria blue R		4	
	Cornflower blue B	WD		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
559	Victoria blue B		1,722	[illegible]
	Victoria blue B	Q		
	Victoria blue B extra conc	Q		
	Victoria blue B highly conc	B		
	Victoria blue base	B		
	Victoria pure blue BO	B		
560	Night blue		26	
	Night blue	B		
	Night blue greenish D	G		
562	Fast acid blue		2,108	[illegible]
	Acid blue RBF	I		
	Brilliant wool blue FFR extra	By		
	Brilliant wool blue G	G		
	Fast acid blue B	By		
	Wool blue N	By		
564	Naphthalene green		13,338	[illegible]
	Erio green BB supra	G		
	Kiton fast green VX conc	I		
	Naphthalene green conc	M		
	Naphthalene green V	M		
	Xylene fast green B conc	S		
565	Acid blue B		500	
	Wool blue 2B	A		
	Wool blue 5B	A		
566	Wool green S		105	
	Cyanol fast green G	C		
	Wool green S extra conc	B		
568	Pyronine G		55	
	Pyronine G	L		
569	Acridine red		55	
	Acridine red 3B	L		
571	Rhodamine 6G		31,242	[illegible]
	Rhodamine 6G extra	B		
	Rhodamine 6G extra	By		
	Rhodamine 6G extra	I		
	Rhodamine 6G extra	M		
	Rhodamine 6G conc	G		
	Rhodamine 6GD extra	M		
	Rhodamine 6GDN	BD		
	Rhodamine 6GDN extra	B		
	Rhodamine 6GDN extra	M		
	Rhodamine 6GH	I		
572	Rhodamine G		412	
	Rhodamine G extra	B		
	Rhodamine RRR	G		
573	Rhodamine B		29,083	[illegible]
	Rhodamine B conc	G		
	Rhodamine B extra	B		
	Rhodamine B extra	By		
	Rhodamine B extra	I		
	Rhodamine B extra conc	Q		
	Rosazeine B extra	M		
574	Rhodamine 3B		110	
	Rhodamine 3B extra	I		
579	Xylene red		941	
	Sulpho rhodamine B	M		
	Sulpho rosazeine BG	M		
580	Fast acid violet B		251	
	Fast acid violet B	M		
	Fast acid violet R	M		
	Violamine B	M		
582	Fast acid violet A2R		232	
	Acid violet 4RNOO	B		
	Erio fast fuchsine BL conc	G		
584	Fast acid blue R	M	25	
587	Eosine		5	
	Eosine A conc	Q		
597	Rose bengale B		59	
	Rose bengale B	Q		
	Rose bengale B	M		
601	Coerulein S		50	
	Coerulein S pdr	Q		
602	Acridine yellow		440	
	Acridine golden yellow 2G	L		
603	Acridine orange		9,349	[illegible]
	Acridine orange DHE	DH		
	Acridine orange LP new	BD		
	Brilliant acridine orange A	DH		
	Rhoduline orange N	By		
	Rhoduline orange NO	By		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Phosphine		42,176	$70,475
Acid phosphine R	B		
Canelle AL	B		
Coriphosphine OX extra	By		
Leather phosphine G	G		
Leather phosphine 2G	G		
Patent phosphine G	G		
Patent phosphine G	By		
Patent phosphine G	I		
Patent phosphine 2G	G		
Patent phosphine R	I		
Philadelphia yellow 2G	A		
Phosphine O	M		
Phosphine 3R	A		
Phosphine 3R	GrE		
Rheonine		565	
Runic (Rheonine) AL conc	B		
Runic (Rheonine) GD	B		
Euchrysine		9,483	15,537
Euchrysine GRNTN	B		
Euchrysine RRX	B		
Euchrysine RRDX	B		
Patent phosphine R	B		
Patent phosphine 2R	B		
Patent phosphine GRNTN	B		
Patent phosphine RRDX	B		
Homophosphine		2,520	4,432
Auracine G conc	By		
Corioflavine GOOO	GrE		
Flavophosphine G conc	M		
Quinoline yellow, spirit-soluble		1,320	2,104
Quinoline yellow	By		
Quinoline yellow	S		
Quinoline yellow conc	S		
Quinoline yellow		7,168	10,071
Quinoline yellow conc	By		
Quinoline yellow conc	S		
Quinoline yellow extra	B		
Quinoline yellow KT extra conc	By		
Quinoline yellow N	By		
Quinoline yellow O	M		
Thioflavine S		35	
Direct yellow S	C		
Columbia yellow		1,652	1,307
Chloramine yellow GG	By		
Diamine fast yellow AGG	C		
Diphenyl chlorine yellow FF supra	G		
Thioflavine T		20,283	37,527
Basic yellow T	C		
Basic yellow TCN	C		
Methylene yellow H	M		
Rhoduline yellow 6G	By		
Rhoduline yellow 6GT	By		
Tannoflavine T	S		
Thioflavine T	C		
Thioflavine TCN	C		
Yellow T	C		
Capri blue		110	
Capri blue GON conc	L		
Delphine blue B		2,091	
Brilliant delphine blue B	S		
Modern violet N		440	
Modern violet N pdr	DH		
Chrome heliotrope		110	
Modern heliotrope	DH		
Gallocyanine		2,202	
Brilliant chrome blue P	S		
Gallocyanine paste	S		
Anthracyanine		3,082	8,001
Anthracyanine S pdr	DH		
Chromacetine blue S pdr	DH		
Modern cyanine V pdr	DH		
Modern royal blue pdr	DH		
Chromocyanine		432	
Chromocyanine B paste	DH		
Indalizarin		330	
Indalizarin J paste	DH		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
635	Modern violet		990	$1,10
	Blue 1900 dbl. pdr	DH		
	Gallo violet DF	By		
	Modern violet pdr	DH		
636	Prune		330	
	Naphtha chrome violet 2R	I		
	Violet PDH pdr	DH		
637	Gallamine blue		29,284	
	Gallamine blue extra paste	G		
644	Ultra cyanine		200	
	Ultra cyanine RB	S		
645	Gallazine		712	
	Gallazine A paste conc	DH		
	Gallazine No. 90	DH		
649	Cotton blue		1,404	97
	Cotton blue R extra	B		
	Meldola's blue 3R paste	S		
	Meldola's blue 3R conc	S		
650	Cotton blue BB	B	5	
653	Nile blue		3,435	
	Danubia (Nile) blue BX	B		
	Danubia blue BBX	B		
658	Fast black		1,161	
	Gallophenine P	By		
	Gallophenine VS paste	By		
660	Methylene green		505	3
	Methylene green extra yellowish	M		
	Methylene green B conc	By		
	Methylene green IA	M		
661	Thionine blue		6,129	11,69
	Thionine blue G	I		
	Thionine blue GO	M		
	Thionine blue GO old	M		
663	New methylene blue		6,443	13,99
	Methylene blue NNX	B		
	New methylene blue N	C		
	New methylene blue NX	C		
	New methylene blue NSS	C		
667	Indochromine		203	
	Brilliant alizarin blue R	By		
672	Azo carmine		7,258	7,14
	Azo carmine GX	B		
	Azo carmine GX 97 per cent	B		
	Azo carmine GX standard strength	B		
673	Azo carmine B		2,209	2,13
	Azo carmine	B		
	Azo carmine BX	B		
	Azo carmine BXH	B		
	Rosinduline 2 B bluish	K		
679	Safranine		110	
	Safranine superfine dbl. yellowish	G		
681	New fast gray		3,144	1,67
	Malta gray B	P		
	Malta gray J	P		
	New fast gray	By		
685	Tannin heliotrope	C	50	
686	Iris violet extra	B	30	
687	Rosolane O, T, R		49	
	Methylene heliotrope extra strong	M		
	Rosolane O pdr	M		
688	Rosolane		125	
	Rosolane paste	P		
695	Paraphenylene violet		500	
	Diphene blue B	A		
699	Induline NN		155	
	Fast blue R	B		
	Induline NN	B		
700	Nigrosine (soluble in water)		3,079	1,72
	Nigrosine T	B		
	Nigrosine W extra	WD		
	Nigrosine WLG	B		
	Silver gray P	A		
705	Indamine 6R		3,500	
	Acid cyanine BF	A		
	Indocyanine B	A		
712	Sulphur yellow		10	
	Sulphur yellow G extra	B		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
720	Sulphur black		500	
	Thiogene black MA highly conc	M		
724	Immedial black		940	
	Immedial direct blue B	C		
726	Pyrogene blue		8,929	
	Pyrogene direct blue RI	I		
733	Immedial indone		570	
	Immedial indogene GLC conc	C		
734	Pyrogene yellow		551	
	Pyrogene yellow M	I		
735	Pyrogene indigo		2,314	
	Pyrogene indigo	I		
	Pyrogene indigo conc	I		
746	Katigene green		4,283	
	Immedial green GG extra	C		
	Pyrogene green 3G conc	I		
747	Thional brown		9,228	
	Thional brown G	S		
748	Hydron blue (single strength)		280	$116
	Hydron blue G paste	C		
	Hydron blue G pdr	C		
	Hydron blue R paste	C		
	Hydron blue R pdr	C		
754	Kryogene violet		1,110	
	Kryogene violet 3 RX	B		
759	Anthraflavone G (single strength)		27,721	25,537
	Anthraflavone G paste	B		
	Anthraflavone GC paste	B		
	Anthraflavone GC paste, fine	B		
	Anthraflavone GC pdr	B		
	Anthra yellow G paste	B		
	Anthra yellow GC paste	B		
	Anthra yellow GC paste, fine	B		
	Anthra yellow GC pdr	B		
760	Indanthrene golden orange G (single strength)		67,265	63,342
	Duranthrene golden orange Y paste	BD		
	Helindone golden orange IG paste	M		
	Helindone golden orange IG dbl. paste	M		
	Indanthrene golden orange G paste	B		
	Indanthrene golden orange G dbl. paste	B		
	Indanthrene golden orange G pdr	B		
	Vat golden orange G dbl. paste	B		
761	Indanthrene golden orange R (single strength)		79,717	88,968
	Helindone golden orange IRRT paste	M		
	Helindone golden orange IRRT paste, fine	M		
	Helindone golden orange IRRT pdr	M		
	Indanthrene golden orange RRT paste	B		
	Indanthrene golden orange RRT paste, fine	B		
	Indanthrene golden orange RRT pdr	B		
	Indanthrene golden orange RRTS pdr	B		
	Vat orange RRT paste	B		
	Vat orange RRT paste	By		
762	Indanthrene scarlet GS pdr		566	
	Indanthrene scarlet GS pdr	B		
	Vat orange 4R pdr	B		
763	Indanthrene dark blue BO (single strength)		5,051	2,944
	Helindone dark blue IBOA paste	M		
	Indanthrene dark blue BO extra paste	B		
	Indanthrene dark blue BO pdr	B		
765	Indanthrene green B (single strength)		40,420	18,607
	Helindone black IBB pdr	M		
	Helindone blue green IB dbl. paste	M		
	Indanthrene black	B		
	Indanthrene black 2B extra paste	B		
	Indanthrene black 2B dbl. paste	B		
	Indanthrene blue green B dbl. paste	B		
	Vat black BB dbl. paste	B		
	Vat blue green B dbl. paste	B		
767	Indanthrene violet RR (single strength)		24,506	15,752
	Helindone violet IRR extra paste	M		
	Helindone violet IRR extra pdr	M		
	Helindone violet DIRR extra paste	M		
	Indanthrene violet RR extra paste	B		
	Indanthrene violet RR dbl. paste	B		
	Indanthrene violet RR pdr	B		
	Indanthrene violet RR extra pdr	B		
	Vat brilliant violet RR paste	B		
	Vat brilliant violet RR pdr	B		
	Vat brilliant violet RRP pdr	B		
768	Indanthrene violet B paste	B	53	

TABLE 16.—*Dyes imported into the United St*

Schultz No.	Name of dye
774	Alizarin black 25 per cent paste
	Alizarin black S paste 25 per cent
	Alizarin black S paste 25 per cent
	Alizarin black S pdr
	Alizarin black WR pdr
	Alizarin black WX extra S paste 40 per cent
778	Alizarin, synthetic—20 per cent paste
	Alizarin
	Alizarin pdr
	Alizarin VI extra pure 20 per cent
	Alizarin red 1B extra paste 20 per cent
	Alizarin red DIB extra paste 20 per cent
779	Alizarin orange 20 per cent paste
	Alizarin orange 20 per cent
	Alizarin orange AO 20 per cent
	Alizarin orange A 20 per cent
	Alizarin orange pdr. 80 per cent
780	Alizarin red powder
	Alizarin carmine pdr
	Alizarin red IWS pdr
	Alizarin red S pdr
	Alizarin red S pdr
	Alizarin red W pdr
782	Alizarin brown
	Anthracene brown R pdr
	Anthracene brown RD paste
784	Alizarin SX, GD paste
	Alizarin SX 20 per cent paste
	Alizarin red SX extra paste
	Alizarin red SX 20 per cent paste
785	Alizarin RG, GI
	Alizarin SDG 20 per cent paste
	Alizarin red XGP 20 per cent paste
	Alizarin red YCA 20 per cent paste
788	Alizarin cyanine
	Alizarin cyanine NS pdr
790	Acid Alizarin Blue BB
	Anthracene blue SWB pdr
	Anthracene blue SWGG extra pdr
	Anthracene blue SWR pdr
792	Cibanone orange R (single strength
	Cibanone orange R pdr
794	Cibanone black (single strength)
	Cibanone black B paste 10 per cent
	Cibanone black 2G pdr. 100 per cent
795	Cibanone yellow R (single strength)
	Cibanone yellow R paste 10 per cent
	Cibanone yellow R pdr
798	Alizarin maroon W
	Alizarin maroon
799	Alizarin cyanine G
	Alizarin cyanine G pdr
	Alizarin cyanine NSG pdr
800	Anthracene blue
	Anthracene blue WG paste
	Anthracene blue WBC paste
	Anthracene blue WGC paste
803	Alizarin blue WX, A
	Alizarin blue B pdr
804	Alizarin blue S
	Alizarin blue S extra paste
	Alizarin blue S pdr
	Alizarin blue SB pdr
807	Alizarin black S
	Alizarin black S paste
808	Alizarin green S paste
	Alizarin green S paste
	Alizarin green S paste
810	Helindone yellow (single strength)
	Vat yellow RK paste
	Vat yellow RK pdr
811	Algol yellow 3G (single strength)
	Algol yellow 3G paste
	Algol yellow 3G pdr
813	Indanthrene copper R paste

[1] 5,815 pounds of paste, 2,133 pounds of pdr.

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
814	Algol yellow WF (single strength)		792	
	Algol yellow WF pdr	By		
816	Algol red 5G (single strength)		793	$381
	Algol red 5G pdr	By		
	Algol red 5GK paste	By		
	Algol red 5GK pdr	By		
817	Algol yellow R (single strength)		3,517	1,070
	Algol yellow R pdr	By		
	Vat yellow GK paste	By		
	Vat yellow GK pdr	By		
818	Algol pink R (single strength)		1,636	
	Algol pink R paste	By		
	Algol pink R pdr	By		
819	Algol red FF, R (single strength)		25,228	12,809
	Algol brilliant red 2B paste	By		
	Algol brilliant red 2B pdr	By		
	Algol brilliant red 2B extra pdr	By		
	Algol red FF extra paste	By		
	Algol red FF pdr	By		
	Algol red R paste	By		
	Algol red R pdr	By		
820	Algol brilliant violet R (single strength)		15,381	12,763
	Algol brilliant violet R paste	By		
	Algol brilliant violet R pdr	By		
	Duranthrene brilliant violet R paste	BD		
	Duranthrene brilliant violet R pdr	BD		
	Vat brilliant violet RK paste	By		
	Vat brilliant violet RK pdr	By		
821	Algol brilliant violet 2B (single strength)		5,591	4,496
	Algol brilliant violet 2B pdr	By		
	Indanthrene brilliant violet 2BK paste	By		
	Indanthrene brilliant violet 2BK pdr	By		
822	Algol brilliant orange FR (single strength)		4,684	3,989
	Algol brilliant orange FR paste	By		
	Algol brilliant orange FR pdr	By		
	Indanthrene orange RRK pdr	Q		
824	Algol orange R (single strength)		4,222	1,777
	Algol orange R paste	By		
	Algol orange R pdr	By		
	Indanthrene orange 6RTK pdr	By		
825	Algol red B (single strength)*		160	
	Algol red B pdr	By		
827	Indanthrene claret B extra (single strength)		13,306	13,361
	Anthra bordeaux R paste	B		
	Anthra claret R paste fine	B		
	Anthra bordeaux R pdr	B		
	Indanthrene bordeaux R extra paste	B		
828	Indanthrene claret B (single strength)		7,180	
	Indanthrene bordeaux B pdr	B		
	Vat heliotrope R dbl. paste	B		
830	Indanthrene red R (single strength)		1,317	
	Indanthrene red R paste	B		
831	Indanthrene red BN (single strength)		16,825	16,590
	Caledon red BN paste	Scot		
	Duranthrene red BN paste	BD		
	Helindone red BIDN paste	M		
	Indanthrene red BN pdr	B		
	Indanthrene red BN extra paste	B		
	Indanthrene red BN extra pdr	B		
	Indanthrene red RK paste	B		
	Indanthrene red RK paste fine	B		
	Indanthrene red RKP pdr	B		
832	Indanthrene violet RN (single strength)		20,435	26,381
	Helindone violet IBN extra paste	M		
	Indanthrene violet BN paste	B		
	Indanthrene violet BN extra paste	B		
	Indanthrene violet BN paste fine	B		
	Indanthrene violet BN pdr	B		
833	Algol olive R (single strength)		1,050	583
	Algol olive R paste	By		
	Algol olive R pdr	By		
	Vat olive R paste	By		
834	Algol gray (single strength)		1,557	
	Algol gray 2B paste	By		
	Vat gray K pdr	By		
836	Helindone brown 3GN paste	M	110	

TABLE 16.—*Dyes imported into the United*

Schultz No.	Name of dye
837	Indanthrene blue R powder
838	Indanthrene blue RS (single strength)
	Indanthrene blue RS paste
	Indanthrene blue RS pdr
	Indanthrene blue RS triple pdr
	Indanthrene blue RSP dbl. paste
	Indanthrene blue RSP triple pdr
840	Indanthrene blue 3G (single strength)
	Indanthrene blue 3G paste
	Indanthrene blue 3G pdr
	Indanthrene blue 3G dbl. paste
	Indanthrene blue 3G paste fine
841	Indanthrene blue GGS (single strength)
	Indanthrene blue GGSP dbl. paste
	Indanthrene blue GGSNP quintuple pdr
842	Indanthrene blue GCD (single strength)
	Helindone blue IGCD dbl. paste
	Indanthrene blue GCD paste
	Indanthrene blue GCD dbl. paste
	Indanthrene blue GCD dbl. paste fine
	Indanthrene blue GCD pdr
844	Algol blue 3G (single strength)
	Algol blue 3G paste
	Algol blue 3G pdr
	Indanthrene blue 5G paste
	Indanthrene blue 5G pdr
847	Algol green B paste
848	Indanthrene gray (single strength)
	Indanthrene gray B dbl. paste
849	Indanthrene yellow (single strength)
	Helindone yellow IG dbl. paste
	Helindone yellow DIG dbl. paste
	Indanthrene yellow G paste
	Indanthrene yellow G dbl. paste
	Indanthrene yellow G pdr
	Indanthrene yellow GP pdr
850	Indanthrene blue WB powder
851	Alizarin direct blue B
852	Alizarin irisol D, R
	Alizarin blue JR pdr
	Alizarin direct violet R pdr
	Alizarin irisol R pdr
853	Anthraquinone violet powder
	Anthraquinone violet
	Anthraquinone violet, standard strength
	Anthraquinone violet pdr
854	Alizarin viridine
	Alizarin viridine FF paste
855	Alizarin pure blue
	Alizarin pure blue B pdr
	Alizarin sky blue B pdr
	Alizarin sky blue B 65 per cent pdr
856	Alizarin astrol
	Alizarin astrol B
	Alizarin astrol B pdr
	Alizarin blue AS pdr
858	Alizarin saphirol B
	Alizarin blue SAP pdr
	Alizarin light blue B
	Alizarin light blue B conc
	Alizarin saphirol B pdr
	Alizarin saphirol SE pdr
	Alizarin saphirol SAE pdr
	Alizarin saphirol WSA pdr
	Alizarin saphirol SAWSA pdr
	Helio fast blue BL pdr
	Helio fast blue SL conc
859	Cyananthrol R
	Alizarin direct blue RXO
	Cyananthrol R
	Cyananthrol RXO
860	Cyananthrol G
	Alizarin direct blue BGAOO
	Cyananthrol BGA
	Cyananthrol BGAO
	Cyananthrol BGAOO
861	Anthraquinone blue SR
	Anthraquinone blue SR extra pdr

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

Schultz No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
862	Alizarin blue black		70,917	$49,133
	Alizarin blue black B pdr	By		
	Alizarin blue black B pdr	M		
	Alizarin blue black 3B pdr	By		
	Alizarin blue black 3B pdr	M		
	Alizarin blue black BT pdr	B		
863	Anthraquinone blue green		179	
	Anthraquinone blue green BXO pdr	B		
864	Anthraquinone green GX		1,050	
	Anthraquinone green GXNO pdr	B		
865	Alizarin direct green G		16,241	28,764
	Alizarin brilliant green G	C		
	Alizarin cyanine green G extra pdr	By		
	Alizarin cyanine green 3G pdr	By		
	Alizarin cyanine green E pdr	By		
	Alizarin cyanine green EF pdr	I		
	Alizarin direct green G pdr	M		
867	Indanthrene brown (single strength)		12,799	2,541
	Duranthrene brown B paste	BD		
	Anthra brown B dbl. paste	B		
	Indanthrene brown B dbl. paste	B		
868	Cibanone brown (single strength)		2,007	
	Cibanone brown B pdr	I		
869	Algol brown B (single strength)		55,081	54,242
	Algol brown R paste	By		
	Algol brown R pdr	By		
	Indanthrene brown R paste	By		
	Indanthrene brown R pdr	By		
870	Algol corinth R (single strength)		1,592	1,444
	Algol corinth R pdr	By		
	Indanthrene corinth RK paste	By		
	Indanthrene corinth RK pdr	By		
873	Helindone brown AN (single strength)		836	869
	Helindone brown AN paste	M		
	Indanthrene brown GR paste	B		
	Indanthrene brown GR pdr	B		
	Indanthrene red brown R extra paste	B		
	Indanthrene red brown R pdr	B		
876	Indigo, white		110	
	Indigosol DH	DH		
880	Indigo RB (single strength)		690	348
	Helindone blue BB paste	M		
	Indigo MLB/2B pdr	M		
	Indigo RB dbl. paste	B		
881	Ciba blue 2BD paste	I	6,417	
882	Ciba blue G (single strength)		11	
	Indigo MLB/5B pdr	M		
883	Indigo KG (single strength)		4,855	
	Durindone blue 6B pdr	BD		
	Indigo MLB/6B pdr	M		
885	Brilliant indigo BD (single strength)		14,835	
	Brilliant indigo B paste	B		
	Brilliant indigo B paste	By		
886	Brilliant indigo G paste	B	2,565	
887	Brilliant indigo 4G (single strength)		2,917	2,794
	Brilliant indigo 4G paste	B		
	Brilliant indigo 4G pdr	B		
	Brilliant indigo BASF/4G paste	B		
890	Ciba yellow G paste 10 per cent	I	2,204	
892	Helindone green G (single strength)		2,202	
	Helindone green G paste	M		
	Helindone green G pdr	M		
893	Alizarin indigo G paste 10 per cent		17,289	
	Alizarin indigo G paste	By		
	Alizarin indigo G pdr	By		
894	Alizarin indigo B paste		1,763	
	Alizarin indigo green B paste	By		
895	Alizarin indigo 3R paste	By	1,362	
896	Helindone blue 3GN (single strength)		7,360	
	Helindone blue 3GN pdr	M		
897	Ciba heliotrope B paste	I	110	
899	Ciba gray paste		882	
	Ciba gray G paste 20 per cent	I		

TABLE 16.—*Dyes imported into the United*

Schultz No.	Name of dye
901	Ciba violet B (single strength)
	Ciba violet B paste 10 per cent
	Ciba violet B paste 20 per cent
	Ciba violet B pdr
	Ciba violet R paste 20 per cent
	Ciba violet R pdr
902	Helindone brown 2R (single strength)
	Helindone brown 2R paste
	Thioindigo brown R pdr
904	Helindone brown G (single strength)
	Helindone brown G paste
	Thioindigo brown G pdr
906	Ciba red G paste
907	Ciba scarlet (single strength)
	Ciba scarlet G extra paste
	Ciba scarlet G pdr
	Helindone fast scarlet C paste
	Thioindigo scarlet 2G paste
	Thioindigo scarlet 2G pdr
908	Ciba red R paste 20 per cent
910	Helindone pink (single strength)
	Helindone pink AN paste
	Helindone pink Bn paste
	Thioindigo pink AN paste
	Thioindigo pink BN extra paste
911	Ciba orange G paste 10 per cent
912	Thioindigo red B (single strength)
	Ciba pink B paste
	Ciba pink BG paste
	Ciba pink BG pdr
	Durindone red B paste
913	Helindone orange R (single strength)
	Helindone orange R paste 10 per cent
	Helindone orange R pdr
	Thioindigo orange R pdr
	Thioindigo orange RY paste 20 per cent
	Thioindigo yellow 3GN paste 20 per cent
915	Helindone fast scarlet R (single strength)
	Helindone fast scarlet R paste
	Helindone fast scarlet R pdr
917	Helindone red B paste
918	Helindone red 3B (single strength)
	Durindone red 3B paste
	Helindone red 3B paste 20 per cent
	Helindone red 3B pdr
	Thioindigo red 3B paste
	Thioindigo red 3B pdr
	Vat red violet RH paste 20 per cent
	Vat red violet RH pdr
919	Ciba bordeaux B (single strength)
	Ciba bordeaux B paste 10 per cent
	Ciba bordeaux B pdr
920	Helindone violet (single strength)
	Helindone violet R pdr
921	Helindone gray BB (single strength)
	Vat gray 6B paste
	Vat gray 6B pdr
923	Ursol
	Fur black DB, DG
	Fur blue black A, SA
	Fur blue gray
	Fur brown NZ, NZD, P, PR, PY, 2R, 4R, SK, SP, SO.
	Fur gray AL, ALA, B, G, R
	Fur gray brown SLA
	Fur olive DA, 3G
	Fur red brown 6R
	Fur yellow 2G, 4G
	Fur yellow brown A, 4GL
	Fur dye DF, 2G, SB, SC
	Nako DR, 3GA, PS, RH
	Nako black DD, D2B, O
	Nako yellow SEL
	Ursol D lumps
	Ursol SG

BLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED ACID DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
R	I	220	
red R conc	G	110	
yellow G conc	S	2,202	
ue R supra	G	5,201	
line		3,568	$4,478
damine BG	B		
damine G	B		
damine 3R	G		
damine R	Q		
damine RG	Q		
let	Q	11	
ray	Q	22	
B purple	Q	22	
ct violet ER pdr	B	355	
raldole G pdr	By	126	
raldole green G	Q	30	
nol		48,826	110,212
rubinol 3G pdr	By		
rubinol 5G pdr	By		
rubinol GW pdr	By		
rubinol R pdr	By		
ole		550	925
uranole 2B	By		
uranole R	By		
wn		20	
l brown B	C		
l brown R	C		
		965	
ithosine) 3B	B		
ithosine) 5B	B		
ne brown GL	By	105	
e B pdr	K	110	
onc	S	201	
3B	C	202	
2G conc., 2GN conc	S	700	
let 7R	C	1,000	
ling blue B	C	8,540	7,574
ling red R	C	1,100	
hthol blue R	C	220	
e yellow 6G extra	By	396	
ack TN	By	55	
ack		330	503
t black BN	I		
t black 2BN	I		
t black 4BN	I		
l GR conc	I	661	
	GrE	100	
	G	7,804	
nine		2,315	5,931
cyanine S	G		
cyanine S conc	G		
cyanine SE	G		
et		275	
violet BMS conc	G		
violet RMS conc	G		
TB pdr	DH	55	
e A pdr	GrE	4,480	
en 8B pdr	GrE	1,792	
rine blue		800	
marine blue HBBX	B		
marine blue HBTA	B		
RH	BD	500	
l BL	By	899	
green 2G conc	S	110	
n		250	188
rown GL	A		
rown 2GL	A		
rown R	A		
rown RD	A		
rown 2R	A		
rown 2RD	A		
ed		8,325	7,129
st red BL	A		
st red 2BL	A		
st red 2R	A		
e 4R	A	10	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED ACID DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Havana brown		40	
Havana brown 5G	B		
Havana brown S	C		
Ink blue		784	$1,579
Ink blue BITN	GrE		
Ink blue BJTNO	GrE		
Ink blue BJTBNOO	GrE		
Kiton fast green A conc	I	992	
Kiton fast red 4BL	I	2,454	
Kiton pure blue AFL	I	441	
Kiton yellow G	I	331	
Milling brown		255	
Milling brown 3G	A		
Milling brown R	A		
Naphthalene blue black	Q	45	
Neolan black 2G	I	110	
Neolan blue		991	
Neolan blue B	I		
Neolan blue 2G	I		
Neolan green B	I	220	
Neolan gray B new	I	110	
Neolan navy blue		96	
Neolan navy blue 2G	I		
Neolan navy blue R	I		
Neolan pink		661	
Neolan pink B	I		
Neolan pink G	I		
Neolan red R	I	110	
Oxamine acid brown		2,700	
Minaxo acid brown G	B		
Oxamine acid brown G	B		
Palatine light yellow		3,961	
Palatine light yellow RX	B		
Pilatus light yellow RX	B		
Polar maroon VC	G	2,205	
Polar orange R conc	G	6,908	
Polar red		15,031	14,999
Polar red 3B conc	G		
Polar red G conc	G		
Polar red R conc	G		
Polar red RS conc	G		
Polar yellow		13,453	
Polar yellow 2G conc	G		
Polar yellow 5G conc	G		
Radio brown B	C	200	
Radio red G	C	100	
Radio yellow R	C	20	
Scarlet 2R	S	500	
Silk blue BIC	A	500	
Special blue G	B	125	
Sulphon acid brown 2R	By	33	
Sulphon orange G	By	20	
Sulphon yellow 5G conc	By	11	
Supramine black BR	By	1,000	
Supramine brown R	By	656	
Supramine red		745	857
Supramine red B	By		
Supramine red 2G	By		
Spruce red B	B		
Supramine yellow		1,106	1,085
Supramine yellow G	By		
Supramine yellow R	By		
Spruce yellow R	B		
Wool black N for printing	I	441	
Wool fast blue		2,154	2,200
Wool fast blue BL	B		
Wool fast blue BL	By		
Wool fast blue GL	By		
Wool fast orange G	B	50	
Wool fast red BL	By	134	
Wool fast yellow 3G	B	660	
Wool printing black CUI	I	441	
Wool red G	B	30	
Wool violet RC	O	55	
Xylene fast blue AE conc	S	110	
Xylene milling red B conc	S	110	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED VAT DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Algol brilliant pink (single strength)		3,452	$3,995
Algol brilliant pink FB paste	By		
Algol brilliant pink FF paste	By		
Vat brilliant pink FF paste	By		
Algol brilliant red B (single strength)		936	
Algol brilliant red B pdr	By		
Algol brown G (single strength)		18,074	16,556
Algol brown G paste	By		
Algol brown G pdr	By		
Vat brown G paste	By		
Vat brown G pdr	By		
Alizarin indigo brown R paste	By	10	
Alizarin indigo 5R paste	By	399	
Ciba printing black 20 per cent paste		220	
Ciba printing black B	I		
Ciba printing black G	I		
Cibanone brown R paste	I	1,984	
Grelanone yellow G paste	GrE	560	
Helindone black		528	
Helindone black paste	M		
Helindone black T	M		
Helindone bordeaux B extra paste	M	220	
Helindone brown JG paste	M	300	
Helindone fast scarlet	M	992	
Helindone fast scarlet G paste	M		
Helindone fast scarlet GG paste	M		
Helindone golden orange DJG (single strength)		881	
Helindone golden orange DJG paste	M		
Helindone golden orange DJG pdr	M		
Helindone pink		47,771	44,643
Helindone pink B extra paste	M		
Helindone pink R extra paste	M		
Helindone pink RN extra paste	M		
Helindone violet 2R paste	M	209	
Helindone yellow		150	
Helindone yellow AGC paste	M		
Helindone yellow DAGC paste	M		
Hydron bordeaux (single paste)		1,208	
Hydron bordeaux B dbl. paste	C		
Hydron bordeaux R dbl. paste	C		
Hydron brown (single strength)		4,065	3,439
Hydron brown CG	C		
Hydron brown G paste	C		
Hydron brown OG pdr	C		
Hydron brown R paste	C		
Hydron dark blue (single strength)		80	32
Hydron dark blue G paste	C		
Hydron dark blue G pdr	C		
Hydron dark blue GG paste	C		
Hydron dark blue GG pdr	C		
Hydron green		689	
Hydron green B paste	C		
Hydron green G paste	C		
Hydron navy blue (single strength)		52	40
Hydron navy blue C paste	C		
Hydron navy blue C pdr	C		
Hydron navy blue G paste	C		
Hydron olive		503	
Hydron olive GN paste	C		
Hydron olive R paste	C		
Hydron orange		3,521	3,916
Hydron orange FB paste	C		
Hydron orange R paste	C		
Hydron orange RE paste	C		
Hydron pink (single strength)		55,428	62,364
Hydron pink FB paste	C		
Hydron pink FF paste	C		
Hydron pink FF pdr	C		
Hydron scarlet (single strength)		17,354	19,012
Hydron scarlet 2B paste	C		
Hydron scarlet 2B pdr	C		
Hydron scarlet 3B paste	C		
Hydron violet (single strength)		1,232	1,138
Hydron violet B paste	C		
Hydron violet R paste	C		
Hydron violet R pdr	C		

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED VAT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Hydron wool brown D, G	C	10	
Hydron wool olive B	C	5	
Hydron wool red BB	C	5	
Hydron wool yellow G	C	5	
Hydron yellow NF paste	C	700	
Indanthrene blue BCD (single strength)		800	
Indanthrene blue BCD dbl. paste fine	B		
Indanthrene blue BCS (single strength)		13,240	
Indanthrene blue BCS pdr	B	3,336	
Indanthrene blue RC (single strength)			
Indanthrene blue RC paste	B		
Indanthrene blue RC pdr	B		
Indanthrene blue RO paste	B	988	
Indanthrene blue RZ (single strength)		5,430	$1,448
Indanthrene blue RZ dbl. paste	B		
Indanthrene blue RZ pdr	B		
Indanthrene blue REZ pdr	B		
Indanthrene blue 3GT paste	By	10	
Indanthrene brilliant red 2B paste	By	1,001	
Indanthrene brown 3R paste	Q	716	
Indanthrene golden orange 3R (single strength)		1,974	1,473
Helindone golden orange 13R paste	M		
Indanthrene golden orange 3R paste	B		
Indanthrene orange 3R paste	B		
Indanthrene gray 3B (single strength)		200	
Indanthrene gray 3B dbl. paste	B		
Indanthrene pink (single strength)		13,348	12,203
Anthra pink B extra paste	B		
Anthra pink R extra paste	B		
Indanthrene pink B dbl. paste	B		
Indanthrene red violet (single strength)		3,682	3,113
Indanthrene red violet RRN paste	B		
Vat red violet RRK paste	B		
Vat red violet RRK paste fine	B		
Thioindigo pink RN		6,487	3,110
Thioindigo pink RN paste	K		
Thioindigo pink RN extra paste	K		
Thioindigo rose RN extra paste	K		
Thioindigo violet 2R (single strength)		4,280	
Thioindigo violet 2R paste	K		
Thioindigo violet 2R pdr	K		
Vat orange R paste	GrE	330	
Vat violet BR paste	GrE	112	
Vat yellow 3RT (single strength)		6	
Vat yellow 3RT pdr	B		

UNIDENTIFIED MORDANT AND CHROME DYES

Acid alizarin gray G	M	13,520	$2,613
Acid chrome blue		12	
Acid chrome blue BH	By		
Acid chrome blue 2R	By		
Alizarin bordeaux 2G paste	By	110	
Alizarin cyclamine R paste	By	707	
Alizarin fast black SP paste	By	418	
Alizarin fast gray 2BL pdr	By	5,257	12,916
Alizarin geranole B pdr	By	991	
Alizarin light green EF pdr	GrE	2,240	
Alliance fast brown 5G	BD	25	
Anthracene chromate brown EB	C	8,420	10,217
Anthracene chrome blue R	C	30	
Brilliant chrome blue		440	
Brilliant chrome blue 2B	DH		
Brilliant chrome blue S	DH		
Chromanol black RVL	DH	110	
Chromanol blue NR pdr	DH	881	
Chrome azurine	DH	396	
Chrome azurine G	DH		
Chrome azurine P	DH		
Chrome fast cyanine GN	I	110	
Chrome fast green B	S	220	
Chrome fast phosphine R	DH	55	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED MORDANT AND CHROME DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Chrome fast printing red		200	
Chrome fast printing red BD paste	By		
Chrome fast printing red GD paste	By		
Chrome printing azurine G pdr	I	5	
Chrome printing bordeaux B pdr	I	5	
Chrome printing brown 5G pdr	I	5	
Chrome printing green B pdr	I	5	
Chrome printing orange		10	
Chrome printing orange G pdr	I		
Chrome printing orange 2R pdr	I		
Chrome printing red		555	$1,267
Chrome printing red B pdr	DH		
Chrome printing red B pdr	I		
Chrome printing red RY	DH		
Chrome printing red Y	DH		
Chrome printing violet N	I	661	
Chrome violet		340	1,053
Chrome violet CBD	DH		
Chrome violet C3BD	DH		
Chrome violet YM pdr	M		
Chromochlorine G pdr	DH	110	
Chromorhodine		2,917	9,256
Chromorhodine BN pdr	DH		
Chromorhodine BR pdr	DH		
Chromorhodine 6GN extra pdr	DH		
Chromoxane brilliant blue G	By	2,505	3,012
Chromoxane violet R	By	99	
Cloth yellow R pdr	GrE	100	
Eriochrome black DF conc	G	220	
Eriochrome brilliant green G supra	G	110	
Eriochrome flavine A conc	G	10,713	
Eriochrome green		771	
Eriochrome green L	G		
Eriochrome green O	G		
Eriochrome red	G	3,085	
Lanasol blue B	I	881	
Lanasol brown 2R	I	1,102	
Metachrome black AG	A	5	
Metachrome blue black 2BX	A	7,000	
Metachrome brilliant blue BL	A	5	
Metachrome brown 6G	A	5	
Metachrome green 3G	A	5	
Metachrome olive		2,505	1,404
Metachrome olive B	A		
Metachrome olive D	A		
Metachrome olive 2G	A		
Metachrome olive brown		5,800	
Metachrome olive brown G	Bro		
Metachrome olive brown G	A		
Metachrome violet		470	
Metachrome violet B	A		
Metachrome violet 2R	A		
Modern green N pdr	DH	220	
Modern gray RCN	DH	220	
Modern olive IN pdr	DH	165	
Monochrome brown EF	By	500	
Naphthochrome blue BN	I	110	
Naphthochrome cyanine R	I	110	
Naphthochrome green G	I	110	
Naphthochrome violet 4B	I	110	
Nitrosine pdr	DH	55	
Omega chrome brown		11,511	
Omega chrome brown G conc	S		
Omega chrome brown PB conc	S		
Oxychrome blue black BG pdr	GrE	1,344	
Printing violet BD paste	I	132	
Ultra brown R	S	55	
Ultra cyanol B conc	S	600	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED DIRECT DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Benzo bordeaux 6B	By	220	
Benzo chrome blue black B	By	110	
Benzo chrome brown		327	[illegible]
Benzo chrome brown B	By		
Benzo chrome brown 5G	By		
Benzo chrome brown R	By		
Benzo copper blue 2B	By	110	
Benzo dark brown extra	By	551	
Benzo fast black		4,539	[illegible]
Benzo fast black	Q		
Benzo fast black L	By		
Benzo fast black NL	Q		
Benzo fast blue FFL	By	220	
Benzo fast bordeaux		2,202	[illegible]
Benzo fast bordeaux 6BL	By		
Benzo light bordeaux 6BL	By		
Benzo fast brown		5,903	[illegible]
Benzo fast brown 3GL	By		
Benzo fast brown RL	By		
Benzo light brown 3GL	By		
Benzo fast eosine BL	By	153	
Benzo fast gray BL		2,854	
Benzo fast gray BL	By		
Benzo light gray BL	By		
Benzo fast heliotrope		3,289	[illegible]
Benzo fast heliotrope BL	By		
Benzo fast heliotrope 4BL	By		
Benzo fast heliotrope 5RH	By		
Benzo fast orange		1,537	[illegible]
Benzo fast orange 2R	By		
Benzo fast orange 2RL	By		
Benzo light orange 2RL	By		
Benzo fast orange S	By	1,421	
Benzo fast rubine		132	
Benzo fast rubine BL	By		
Benzo light rubine BL	By		
Benzo fast scarlet 5BL, 2GL	By	22	
Benzo fast violet BL	By	564	
Benzo red 12B	By	3,722	[illegible]
Benzo rhoduline red		1,802	[illegible]
Benzo rhoduline red B	By		
Benzo rhoduline red 3B	By		
Benzo scarlet BC	By	110	
Brilliant benzo fast violet 2RL	By	218	
Brilliant benzo fast yellow GL	By	11	
Brilliant benzo green B	By	10	
Brilliant benzo violet B, 2BH, 2BR	By	3,179	[illegible]
Brilliant congo blue 5R	A	5	
Brilliant congo violet R	A	5	
Brilliant cotton blue R conc	K	200	
Brilliant fast blue B, 2G	By	176	
Brilliant sky blue		8,458	[illegible]
Brilliant sky blue 8G extra	By		
Brilliant sky blue 2RM	By		
Brilliant sky blue 2RN	By		
Carbazol yellow W pdr	B	11	
Chicago red 111	G	1,650	
Chloramine brown 2R conc	S	500	
Chloramine light blue BS	S	200	
Chloramine light violet R conc	S	200	
Chloramine sky blue RF conc	S	50	
Chloramine violet FFB	Q	100	
Chlorantine black Y	I	4,409	
Chlorantine brown Y	I	2,203	
Chlorantine fast brown		13,558	[illegible]
Chlorantine fast brown 3GL	I		
Chlorantine fast brown 3GL conc	I		
Chlorantine fast brown RL	I		
Chlorantine fast gray B	I	991	
Chlorantine fast orange TRL	I	8,708	
Chlorantine fast violet 2RL	I	1,102	
Chlorantine fast yellow 4GL	I	2,205	
Chlorazol fast black		325	
Chlorazol fast black N	BD		
Chlorazol fast black No. 1	BD		
Chlorazol fast brown RK	BD	1,100	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Chlorazol violet R	BD	2,000	
Chromanil black		700	
Chromanil black BF	A		
Chromanil black FF	A		
Chromopurpurine JJ pdr	DH	220	
Cotton pink RN	B	130	
Developing blue		1,600	$1,190
Developing blue B	A		
Developing blue 2R	A		
Developing blue 4R	A		
Diamine azo fast green G	C	52	
Diamine brilliant scarlet S	C	2,508	
Diamine brilliant violet B	C	3,000	
Diamine catechine		6,643	6,326
Diamine catechine B	C		
Diamine catechine G	C		
Diamine catechine GR dbl. strength	I		
Diamine fast blue		3,808	5,606
Diamine fast blue FFB	C		
Diamine fast blue FFG	C		
Diamine fast blue F3G	C		
Solamine blue FF	A		
Diamine fast bordeaux		4,066	5,117
Diamine fast bordeaux	C		
Diamine fast bordeaux 6BS	C		
Diamine fast brown		2,789	2,772
Diamine fast brown G	C		
Diamine fast brown GB	C		
Diamine fast brown G2B	C		
Diamine fast brown 3G	C		
Diamine fast brown R	C		
Diamine fast gray		2,268	
Diamine fast gray BN	C		
Diamine fast gray NBN	C		
Diamine fast orange		17,793	15,443
Diamine fast orange EG	C		
Diamine fast orange ER	C		
Diamine fast orange R	C		
Diamine fast pink		800	1,128
Diamine fast pink B	C		
Diamine fast pink C	C		
Diamine fast pink G	C		
Diamine fast red violet FR	C	270	
Diamine fast scarlet		155	
Diamine fast scarlet 6BS	C		
Diamine fast scarlet GS	C		
Diamine fast violet		663	
Diamine fast violet FFBN	C		
Diamine fast violet FFRN	C		
Diamine fast yellow 4G	C	50	
Diamine nitrazol green GF	C	518	
Diamine orange		425	
Diamine orange F	C		
Diamine orange G	C		
Diaminogene sky blue		2,261	2,172
Diaminogene sky blue 3B	C		
Diaminogene sky blue N	C		
Sky blue N	C		
Dianil fast blue		210	
Dianil fast blue GL	M		
Dianil fast blue RL	M		
Dianil fast gray RL	M	25	
Dianil fast orange RR	M	100	
Dianil fast scarlet		225	271
Dianil fast scarlet 8BS	M		
Dianil fast scarlet 4B8N	M		
Dianil fast scarlet GS	M		
Dianil fast violet BL	M	220	
Dianil light red 8BL	M	600	
Diazamine black N extra	CN	2,205	
Diazanil black V	M	1,170	
Diazanil blue 2R	M	100	
Diazanil pink B	M	750	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Diazanil scarlet		2,552	$5,119
Diazanil scarlet 3BA	M		
Diazanil scarlet 4BA	M		
Diazanil scarlet 6BA	M		
Diazo blue NA	L	2,205	
Diazo bordeaux 7B	By	7	
Diazo brilliant blue 2BL	By	10	
Diazo brilliant green		325	
Diazo brilliant green BL	By		
Diazo brilliant green 3G	By		
Diazo brilliant scarlet		7,032	8,735
Diazo brilliant scarlet B extra	By		
Diazo brilliant scarlet 2BL extra	By		
Diazo brilliant scarlet 5BL extra	By		
Diazo brilliant scarlet 3B extra	By		
Diazo brilliant scarlet 3BA extra	By		
Diazo brilliant scarlet 6B extra	By		
Diazo brilliant scarlet G extra	By		
Diazo brown		502	469
Diazo brown G	By		
Diazo brown 3G	By		
Diazo brown 3RB	By		
Diazo brilliant orange GR, 5G	By	322	
Diazo dark blue 3B	By	284	
Diazo fast blue		1,983	2,841
Diazo fast blue BR	L		
Diazo fast blue 4RW	L		
Diazo fast blue 6GW	L		
Diazo fast bordeaux BL	By	442	
Diazo fast green		26	
Diazo fast green BL	By		
Diazo fast green BL	A		
Diazo fast red 5BL, 7BL	By	8	
Diazo fast violet		661	
Diazo fast violet BL	By		
Diazo fast violet 3RL	By		
Diazo fast yellow		553	
Diazo fast yellow G	By		
Diazo fast yellow 2G	By		
Diazo geranine B extra	By	738	
Diazo indigo blue 4GL extra	By	2,482	4,725
Diazo light green 2RL	By	11	
Diazo olive G	By	50	
Diazo pure blue		9,926	3,407
Diazo sky blue B	By		
Diazo sky blue 3G	By		
Diazo sky blue 3GL	By		
Diazo rubine B	By	2,930	3,798
Diazo violet R	By	137	
Diazo yellow R	By	199	
Diazogene red B	CJ	850	
Diazol pink NR	P	2,204	
Diazophenyl black V	G	5,407	
Diphenyl fast bordeaux G conc	G	116	
Direct black RMW	C	50	
Direct brown 5G	L	2,205	
Fast cotton blue		550	724
Fast cotton blue FF	A		
Fast cotton blue FFG	A		
Fast cotton blue 4GL	A		
Fast cotton gray VL	A	305	
Formal fast black G conc	G	110	
Ionamine		20	
Ionamine B	BD		
Ionamine H	BD		
Naphthamine fast black K8	K	250	
Naphthamine green AG extra	K	250	
Naphthamine light blue 4B	K	100	
Naphthamine light brown 2G	K	500	
Naphthamine light green G	K	1,000	
Naphthamine light red R	K	500	
Naphthamine light violet 2B	K	500	
Naphthamine pink 2B conc	K	110	
Naphthogene blue B	By	249	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Nitranil brown		330	
Nitranil brown B	I		
Nitranil brown R	I		
Nitranil brown S	I		
Nitranil green B	I	110	
Oxamine black		80	
Oxamine black BBN	B		
Oxamine black BBNX	B		
Oxamine fast blue		2,702	$2,657
Oxamine fast blue 6B	B		
Oxamine fast blue RR	B		
Oxamine fast blue RRX	B		
Oxamine fast pink BX	B	130	
Oxamine light red E8B	B	200	
Oxydiaminogene	C	50	
Para blue 2BX	By	10	
Paranil black 2B	A	5	
Parasulphon brown		1,200	
Parasulphon brown B	S		
Parasulphon brown V	S		
Pluto brown 2G	By	200	
Plutoform black		50	
Plutoform BL	By		
Plutoform black 3GL	By		
Pyrazol orange		400	
Pyrazol orange R conc	S		
Pyrazol orange RR conc	S		
Rosanthrene orange R conc	I	1,604	
Rosanthrene pink	I	661	
Toluylene fast brown 2R	By	11	
Triazol light blue 4GL	GrE	280	
Triazol pure blue 6B	GrE	2,240	
Zambesi black		13,000	5,705
Zambesi black D	A		
Zambesi black D 60 per cent	A		
Zambesi black V	A		
Zambesi black V 77 per cent	A		

UNIDENTIFIED SULPHUR DYES

Cross dye green B	BD	26,242	
Eclipse brown BK	G	10,000	
Immedial violet C	C	850	
Katigene yellow brown GR extra	By	10	
Pyrogene brown DTB new	I	1,102	
Pyrogene cutch brown 2R extra	I	2,205	
Pyrogene indigo blue	S	220	
Pyrogene violet brown X	I	5,070	
Sulphide (thiogene) violet V	M	300	
Sulphur brilliant blue CLB	A	800	
Thiogene new blue 2RL	M	81	
Thional yellow GG	S	7,306	
Thionol black XXN conc	BD	100	
Thionol brown		28,802	
Thionol brown O	BD		
Thionol brown R	BD		
Thionol purple B conc	BD	2,500	

TABLE 16.—*Dyes imported into the United States, 1923*—Continued

UNIDENTIFIED BASIC DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Acridine scarlet J	DH	77	
Brilliant acridine orange		770	
Brilliant acridine orange 3R	DH		
Brilliant acridine orange 5R	DH		
Brilliant cresyl blue 2BS conc	L	110	
Brilliant rhodamine red B	By	24	
Corvoline BT conc	B	100	
Dahlia violet	Q	11	
Flavophosphine GO	M	765	
Indoine A extra pure	G	110	
Leather black TBO	C	50	
Leather brown 5GX	B	5	
Methylene blue 3G	B	165	
New ethyl blue BS	M	11	
Phosphine brown L	G	110	
Phosphine orange	G	110	
Rhodamine 4G		552	$1,140
Rhodamine 4GD	Q		
Rhodamine 4GD extra	M		
Rhodamine 4GDN extra	Q		
Rhoduline blue		77	
Rhoduline blue GO	By		
Rhoduline blue 3GO	By		
Rhoduline sky blue 3G	By	55	

UNIDENTIFIED SPIRIT-SOLUBLE AND COLOR-LAKE DYES

Alizarin green C (soluble in oil)	By	198	
Azonine G, RR, S	C	30	$25
Brilliant lake blue G extra	By	127	
Hansa green G pdr	M	25	
Hansa yellow 5G lumps	M	300	
Helio bordeaux BL paste	By	2,455	
Helio fast violet AL	By	31	
Helio red RM, RMT pdr	By	769	
Japan black		779	$61
Japan black extra	B		
Japan black MBG	B		
Japan black MGB	B		
Oil blue Z	K	10	
Oil brown AN	K	10	
Oil green ALB, ALG	K	20	
Paper fast bordeaux B	By	3,013	
Pigment black extra pdr	B	100	
Printing red	A-S Co	110	
Stone (lithol) fast orange R pdr	B	2,610	
Stone (lithol) fast yellow		650	$62
Stone fast yellow 2G extra pdr	B		
Stone fast yellow 5G lumps	B		
Stone fast yellow GN lumps	B		
Stone fast yellow GR lumps	B		
Tero (typophor) black FB	B	5	
Tero (typophor) brown FR	B	7	
Tero (typophor) carmine FB	B	12	
Tero (typophor) red FG	B	25	
Tero (typophor) yellow FR	B	205	
Yellow II	B	58	
Zapon blue R	B	5	
Zapon violet R	B	5	

UNIDENTIFIED, UNCLASSIFIED DYES

All other aniline dyes		3,151	$3,450
Beaver reddish brown	Q	22	
Pinatype complement red D	M	11	
Red violet HR	P	220	
Sumazine blue	SMS [1]	300	
Thio violet 5R pdr	DH	55	

[1] The Sugar Manufacturers' Supply Co., Ltd., Great Britain.

Index to table of imports

e of dye	Schultz No.	Page
8B	358	81
k R	159	79
k SE	288	80
G		96
rown PG, R, RH	88	78
		93
	562	84
k STC	277	80
BH, 2R		93
	705	86
	524	82
	505	82
	524	82
k, B	265	80
R		93
w G		93
	606	85
	175	79
		93
		93
BG		93
R, RG		93
3R		93
		93
	530	83
	527	82
	530	83
	527	82
	530	83
	548	83
O (B)	548	83
O (By)	527	82
	527	82
	534	83
rple		93
	530	83
	530	83
OO	582	84
G	548	83
ellow 2G	602	84
DHE, LP	603	84
	569	84
		102
	844	90
ange FR	822	89
nk FB, FF		95
d B		95
d 2B	819	89
olet 2B	821	89
olet R	820	89
		95
	869	91
	870	91
	834	89
	847	90
	833	89
	824	89
	818	89
	825	89
	819	89
	816	89
	819	89
	811	88
	817	89
	814	89
ic	778	88
	784	88
	785	88
	778	88
	856	90
(M)	807	88
WX	774	88
	856	90
	803	88
	852	90
B	804	88
P	858	90
k B, BT, 3B	862	91
2G		96
green G	865	91
	780	88
GG	799	88

Name of dye	Schultz No.	Page
Alizarin cyanine NS	788	88
Alizarin cyanine NSG	799	88
Alizarin cyanine green E, EF	865	91
Alizarin cyanine green G, 3G	865	91
Alizarin cyclamine R		96
Alizarin direct blue B	851	90
Alizarin direct blue BGAOO	860	90
Alizarin direct blue RXO	859	90
Alizarin direct green G	865	91
Alizarin direct violet R	852	90
Alizarin direct violet ER		93
Alizarin emeraldole G		93
Alizarin emeraldole green G		93
Alizarin fast black SP		96
Alizarin fast gray 2BL		96
Alizarin geranole B		96
Alizarin green C		102
Alizarin green S	808	88
Alizarin indigo G	803	91
Alizarin indigo 3R	895	91
Alizarin indigo 5R		95
Alizarin indigo brown R		95
Alizarin indigo green B	894	91
Alizarin irisol R	852	90
Alizarin light blue B	858	90
Alizarin light green EF		96
Alizarin maroon	798	88
Alizarin orange, A, AO	779	88
Alizarin pure blue B	855	90
Alizarin red IB, DIB	778	88
Alizarin red IWS, S	780	88
Alizarin red SX	784	88
Alizarin red W	780	88
Alizarin red XGP, YCA	785	88
Alizarin rubinol 3G, 5G, GW, R		93
Alizarin saphirol B	858	90
Alizarin saphirol SE, SAE	858	90
Alizarin saphirol WSA, SAWSA	858	90
Alizarin sky blue B	855	90
Alizarin uranol 2B, R		93
Alizarin viridine FF	854	90
Alizarin yellow 2G, 5G, GD	48	78
Alizarin yellow R	58	78
Alkali blue 3R	536	83
Alkali violet CA	532	83
Alkali violet 4BNOO	532	83
Alkali violet 6BOO	532	83
Alliance fast brown 5G		96
Alphanol brown B, R		93
Amaranth B	168	79
Aniline yellow	6	78
Anthosine 3B, 5B		93
Anthra bordeaux R	827	89
Anthra claret R	827	89
Anthra pink B, R		95
Anthra rubine B		93
Anthra yellow G, GC	759	87
Anthracene acid black ST	277	80
Anthracene acid brown G	221	79
Anthracene blue WBU	800	88
Anthracene blue WG, WGU	800	88
Anthracene blue SWB, SWR	790	88
Anthracene blue SWGG	790	88
Anthracene brown R, RD	782	88
Anthracene chromate brown EB		96
Anthracene chrome blue R		96
Anthracyanine S	627	85
Anthracyanine brown GL		93
Anthraflavone G, GC	759	87
Anthraquinone blue SR	861	90
Anthraquinone blue green BXO	803	91
Anthraquinone green GXNO	864	91
Anthraquinone violet	853	90
Anthrarubine B		93
Auracine G	609	85
Auramine G	494	82
Auramine N, O	493	82
Aurine	555	83
Azo acid blue B	63	78
Azo blue B		93
Azo carmine BX, BXH	673	86
Azo carmine GX	672	86

Index to table of imports—Continued

Name of dye	Schultz No.	Page
Azo chromine NR	84	78
Azo coralline L	65	78
Azo cyanine GR	256	80
Azo orseille BB		93
Azo rhodine 2G		93
Azo wool blue 3E	61	78
Azo wool violet 7R		93
Azonine G, RR, S		102
Basic yellow T, TCN	618	85
Beaver reddish brown		102
Benzoazurine 3G	411	81
Benzo bordeaux 6B		98
Benzo brown D 3G	485	82
Benzo chrome black blue B		98
Benzo chrome brown B, R		98
Benzo chrome brown 5G		98
Benzo copper blue 2B		98
Benzo dark brown		98
Benzo fast black L, NL		98
Benzo fast blue FFL		98
Benzo fast blue 2GL, 4GL	456	81
Benzo fast bordeaux 6BL		98
Benzo fast brown 3GL, RL		98
Benzo fast eosine BL		98
Benzo fast gray BL		98
Benzo fast heliotrope BL		98
Benzo fast heliotrope 4BL, 5RH		98
Benzo fast orange 2R, 2RL		98
Benzo fast orange S		98
Benzo fast orange WS	340	81
Benzo fast pink 2BL	297	80
Benzo fast red 8BL	332	81
Benzo fast rubine BL		98
Benzo fast scarlet 5BS, 8BS, GS	297	80
Benzo fast scarlet 2GL, 5BL		98
Benzo fast yellow RL	296	80
Benzo light blue 2GL, 4GL	456	81
Benzo light bordeaux 6BL		98
Benzo light brown 3GL		98
Benzo light gray BL		98
Benzo light orange 2RL		98
Benzo light rubine BL		98
Benzo pure blue	426	81
Benzo red 12B		98
Benzo rhoduline red B, 3B		98
Benzo scarlet BC		98
Benzo violet O	326	81
Benzopurpurine 10B	405	81
Bismark brown	283	80
Black extra	274	80
Black JD	125	79
Blue 1900	635	86
Brilliant acid blue A, F, FF	545	83
Brilliant acid blue EG	506	82
Brilliant acid blue V	543	83
Brilliant acid green 6B	503	82
Brilliant acridine orange A	603	84
Brilliant acridine orange 3R, 5R		102
Brilliant alizarin blue R	667	86
Brilliant benzo blue 6B	424	81
Brilliant benzo fast violet 2RL		98
Brilliant benzo fast yellow GL		98
Brilliant benzo green B		98
Brilliant benzo violet B, 2BH, 2R		98
Brilliant chrome blue P	626	85
Brilliant chrome blue 2B, S		98
Brilliant congo R	370	81
Brilliant congo blue 3R		98
Brilliant congo violet R		98
Brilliant cotton blue 6B	541	83
Brilliant cotton blue R		98
Brilliant delphine blue B	622	85
Brilliant fast blue B, 2G		98
Brilliant geranine B	118	79
Brilliant glacier blue	501	82
Brilliant indigo B	885	91
Brilliant indigo G	886	91
Brilliant indigo 4G	887	91
Brilliant lake blue G		102
Brilliant milling blue B		93
Brilliant milling green B	503	82
Brilliant milling red R		93

Name of dye	Schultz No.	Page
Brilliant naphthol blue R		
Brilliant pure yellow 6G		
Brilliant rhodamine red B		
Brilliant sky blue 6G, 2RM, 2BN		
Brilliant sulphon red B, 5B		
Brilliant wool blue FFR, G		
Brilliant yellow		
Caledon red BN		
Cannelle AL		
Capri blue GON		
Carbazol yellow W		
Carmine blue V		
Cashmere black TN		
Chicago red III		
Chloramine blue BXR		
Chloramine blue HW		
Chloramine brown 2R		
Chloramine light blue BS		
Chloramine light violet R		
Chloramine orange G		
Chloramine red 3B		
Chloramine red 8B, 8BS		
Chloramine sky blue FF		
Chloramine sky blue RF		
Chloramine violet FFB		
Chloramine yellow GG		
Chlorantine black Y		
Chlorantine brown Y		
Chlorantine fast brown 3G, L, RL		
Chlorantine fast gray B		
Chlorantine fast orange TRL		
Chlorantine fast violet 2RL		
Chlorantine fast yellow 4GL		
Chlorazol fast black N		
Chlorazol fast brown RK		
Chlorazol violet R		
Chromacetin blue S		
Chromanil black BF, FF		
Chromanol black RVI		
Chromanol blue NR		
Chromazone red new conc		
Chromazurine G, P		
Chromazurol S, SXT		
Chrome bordeaux B		
Chrome brown R, RVV		
Chrome fast cyanine GN		
Chrome fast green B		
Chrome fast phosphine R		
Chrome fast printing red BD, GD		
Chrome printing azurine G		
Chrome printing bordeaux B		
Chrome printing brown 5G		
Chrome printing green B		
Chrome printing orange G, 2R		
Chrome printing red B, RY, Y		
Chrome printing violet N		
Chrome violet CBD, C 3BD		
Chrome violet CG		
Chrome violet VM		
Chromochlorine G		
Chromocitronine R, 3R, V		
Chromocyanine B		
Chromopurpurine JJ		
Chromorhodine BN, BR, 6GN		
Chromoxane brilliant blue G		
Chromoxane violet R		
Chrysamine K, KS		
Chrysoidine RL		
Ciba blue 2BD		
Ciba bordeaux B		
Ciba gray G		
Ciba heliotrope B		
Ciba orange G		
Ciba pink B, BG		
Ciba printing black B, G		
Ciba red G		
Ciba red R		
Ciba rose BG		
Ciba scarlet G		
Ciba violet B, R		
Ciba yellow G		
Cibanone black B, 2G		

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me of dye	Schultz No.	Page
rn B	868	91
rn R		95
ge R	792	88
w R	795	88
BN, 2BN, 4BN		93
R	257	80
GR		93
		97
	601	84
G	387	81
R	325	81
R	373	81
	313	80
OOO	609	85
OX	606	85
e B	558	83
		102
o. 2	539	83
	649	86
B	650	86
, BN	121	79
N	122	79
N		99
GI, GX	296	80
n B		101
O, 5BO	516	82
BGA, BGAO,	860	90
, RXO	859	90
	544	83
	546	83
	546	83
	546	83
en G	566	84
		102
BBX	653	86
e 5B	366	81
e B, 2R, 4R		99
st green G		99
nt bordeaux R	319	80
nt scarlet S		99
nt violet B		99
n B	349	81
e G	448	81
hine B, G		99
hine GR		99
lue FFB, PFG, F 3G		99
ordeaux, 6BS		99
rown G, 3G		99
rown GB, G2B		99
rown R		99
ray BN, NBN		99
range EG, R, ER		99
ink B, C, G		99
ed 8BL	343	81
ed violet FR		99
carlet 6BS, GS		99
iolet FFBN, FFRN		99
ellow AGG	617	85
ellow 3G	296	80
ellow 4G		99
zol green GF		99
e B	339	81
e F, G		99
D	119	79
t B, 3B	319	80
xtra	274	80
lack extra	274	80
lue NA, NBB	273	80
ky blue N, 3B		99
B	276	80
nta	512	82
brown G	476	82
GL, RL		99
RL		99
ge RR		99
let 8BS, 4BSN, GS		99
et BL		99
8BL		99
G	25	78

Name of dye	Schultz No.	Page
Diazamine black N extra		99
Diazamine blue BR, NA, RR	273	80
Diazanil black V		99
Diazanil blue 2R		99
Diazanil pink B		99
Diazanil scarlet 3BA, 4BA, 6BA		100
Diazo black OT	308	80
Diazo blue NA		100
Diazo Bordeaux 7B		100
Diazo brillant black B	364	81
Diazo brillant blue 2BL		100
Diazo brillant green BL, 3G		100
Diazo brillant orange GR, 5G		100
Diazo brillant scarlet B		100
Diazo brilliant scarlet G		100
Diazo brilliant scarlet 6B		100
Diazo brilliant scarlet 2BL, 3BA, 5BL		100
Diazo brown 3G, 3RB		100
Diazo dark blue 3B		100
Diazo fast blue BR, 4RW, 6GW		100
Diazo fast Bordeaux BL		100
Diazo fast green BL		100
Diazo fast red 5BL, 7BL		100
Diazo fast violet BL, 3RL		100
Diazo fast yellow G, 2G		100
Diazo geranine B		100
Diazo indigo blue BR, 2RL	274	80
Diazo indigo blue 4GL		100
Diazo light green 2RL		100
Diazo olive G		100
Diazo rubine B		100
Diazo sky blue B, 3G, 3GL		100
Diazo violet R		100
Diazo yellow R		100
Diazogene red B		100
Diazol pink NR		100
Diazophenyl black V		100
Diphene blue B	695	86
Diphenyl brown BBNC, GS	348	81
Diphenyl brown TB	449	81
Diphenyl catechine G	206	79
Diphenyl chlorine yellow FF supra	617	85
Diphenyl chrysoine GC	14	78
Diphenyl fast Bordeaux G		100
Diphenyl fast brown GNC	207	79
Direct black RMW		100
Direct brilliant blue 8B	541	83
Direct brown 5G		100
Direct fast orange K	392	81
Direct fast scarlet 8E	279	80
Direct gray R	354	81
Direct yellow S	615	85
Duranthrene brilliant violet R	820	89
Duranthrene red BN	831	89
Duranthrene brown B	867	91
Duranthrene golden orange Y	760	87
Durindone blue 6B	883	91
Durindone red B	912	92
Durindone red 3B	918	92
Eclipse brown BK		101
Eosamine B	100	79
Eosine A	587	84
Eosine BG		93
Erica B	121	79
Erica 2GN	117	79
Erio blue AB		93
Eriochrome black E	184	79
Eriochrome black DF		97
Eriochrome blue black G	180	79
Eriochrome brilliant green G		97
Eriochrome cyanine RC	553	83
Eriochrome flavine A conc		97
Eriochrome green L, O		97
Eriochrome red		97
Eriochrome verdon S	260	80
Eriocyanine A, AC	531	83
Erio fast cyanine S, SE		93
Erio fast fuchsine BL	582	84
Erio fast violet BMS, RMS		93

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Name of dye	Schultz No.	Page
Erioglaucine A, AB, AP, EP	506	82
Erio green BB supra	564	84
Erio viridine B	503	82
Erythrosine TB		93
Ethyl violet, 6B	518	82
Euchrysine GRNTN	608	85
Euchrysine RRX, RRDX	608	85
Excelsior brown	283	80
Fast acid blue A		93
Fast acid blue B	562	84
Fast acid blue R	584	84
Fast acid green 8B		93
Fast acid marine blue HBBX		93
Fast acid marine blue HBTA		93
Fast acid red RH		93
Fast acid violet B, R	580	84
Fast acid violet 10B	528	82
Fast blue R	699	86
Fast bordeaux B	236	80
Fast cotton blue FF, FFG, 4GL		100
Fast cotton gray VL		100
Fast green bluish	523	82
Fast green extra bluish	523	82
Fast light red BL		93
Fast light yellow, 2G	19	78
Fast light yellow 3G, R	19	78
Fast mordant yellow G	294	80
Fast red AV, AVX	161	79
Fast sulphon green 2G		93
Fast sulphon violet 5BS	182	79
Flavophosphine G	609	85
Flavophosphine GO		102
Formal fast black G		100
Formyl violet S4B	530	83
Fur black DB, DG	923	92
Fur blue black A, SA	923	92
Fur blue gray	923	92
Fur brown NZ, NZD	923	92
Fur brown P, PR, PY	923	92
Fur brown 2R, 4R paste	923	92
Fur brown SK, SKG, SP, SO	923	92
Fur gray AL, ALa	923	92
Fur gray, B, G, R	923	92
Fur gray brown SLA	923	92
Fur olive DA, 3G	923	92
Fur red brown 6R	923	92
Fur yellow 2G, 4G	923	92
Fur yellow brown A, 4GL	923	92
Fur dye DF, 2G, SB, SC	923	92
Gallamine blue	637	86
Gallazine A	645	86
Gallazine #90	645	86
Gallocyanine	626	85
Gallophenine P, VS	658	86
Gallo violet DF	635	86
Geranine G	118	79
Glaucol FF	546	83
Grelanone yellow G		95
Guinea brown GL, 2GL		93
Guinea brown RG, 2R, 3RD		93
Guinea fast green B	503	82
Guinea fast red BL, 2BL		93
Guinea fast red 2R		93
Guinea rubine 4R		93
Hansa green G		102
Hansa yellow G	28	78
Hansa yellow 5G		102
Havana brown 5G, S		94
Helindone black IBB	765	87
Helindone black T		95
Helindone blue BB	880	91
Helindone blue IGCD	842	90
Helindone blue 3GN	896	91
Helindone blue green IB	765	87
Helindone bordeaux B		95
Helindone brown AN	873	91
Helindone brown G	904	92
Helindone brown 3GN	836	89
Helindone brown JG		95
Helindone brown 2R	902	92
Helindone dark blue IBOA	763	87
Helindone fast scarlet C	907	92
Helindone fast scarlet G, GG		93
Helindone fast scarlet R	911	92
Helindone golden orange DJG		93
Helindone golden orange IG	788	87
Helindone golden orange IRRT	783	87
Helindone golden orange LBR		93
Helindone gray BB	921	92
Helindone green G	892	91
Helindone orange R	913	92
Helindone pink AN, BN	910	92
Helindone pink B, R, RN		93
Helindone red B	917	92
Helindone red DIBN	831	89
Helindone red 3B	919	92
Helindone violet R	920	92
Helindone violet 2R		93
Helindone violet 12R, DI2R	787	87
Helindone violet IBN	832	89
Helindone yellow AG, DAGC		93
Helindone yellow IG, DIG	846	90
Helindone yellow 3GN	810	88
Helio bordeaux BL		93
Helio fast blue BL, SL	558	84
Helio fast violet AL		93
Helio red RM, RMT		93
Hydron blue G, R	748	87
Hydron bordeaux B, R		93
Hydron brown G, CG, OG, R		93
Hydron dark blue G, GG		93
Hydron green B, G		93
Hydron navy blue C, G		93
Hydron olive GN, R		93
Hydron orange FR, R, RE		93
Hydron pink FB, FF		93
Hydron scarlet 2B, 3B		93
Hydron violet B, R		93
Hydron wool brown D, G		93
Hydron wool olive B		93
Hydron wool red BB		93
Hydron wool yellow G		93
Hydron yellow NF		93
Immedial direct blue B	734	87
Immedial green GG	746	87
Immedial indogene GCL	733	87
Immedial violet C		93
Indalizarin J	533	83
Indanthrene black BB	765	87
Indanthrene blue BCD		93
Indanthrene blue BCS		93
Indanthrene blue GCD	842	90
Indanthrene blue GGSP	841	90
Indanthrene blue GGSNP	841	90
Indanthrene blue 3G	840	90
Indanthrene blue 5G	844	90
Indanthrene blue R	837	89
Indanthrene blue RC, RQ		93
Indanthrene blue RS, RSP	826	88
Indanthrene blue WB	890	91
Indanthrene blue RZ, REZ		93
Indanthrene blue 3GT		93
Indanthrene blue green B	765	87
Indanthrene bordeaux B extra	827	89
Indanthrene brilliant red 2B		93
Indanthrene brilliant violet BBK	827	89
Indanthrene bordeaux B	825	88
Indanthrene brown B	867	91
Indanthrene brown GR	872	91
Indanthrene brown R	869	91
Indanthrene claret B	828	89
Indanthrene copper R	823	89
Indanthrene corinth RK	870	91
Indanthrene dark blue BO	763	87
Indanthrene golden orange G	789	87
Indanthrene golden orange ERT	783	87
Indanthrene golden orange ERTS	783	87
Indanthrene golden orange 3R		93
Indanthrene gray B	845	90
Indanthrene gray 3B		93
Indanthrene orange RRK	822	89
Indanthrene orange 6RTK	824	89
Indanthrene pink B		93
Indanthrene red BN	831	89

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ne of dye	Schultz No.	Page
1 RK, RKP	831	89
1 R	830	89
1 brown R	873	91
1 violet RRN		96
rlet GS	762	87
let B	768	87
let BN	832	89
let RR	767	87
llow G	849	90
llow GP	849	90
F	141	79
	880	91
	880	91
	882	91
	883	91
	876	91
	607	86
	705	86
		102
	699	86
		94
O, BJTNOO		94
		100
	686	86
	125	79
	435	81
	124	79
	240	80
	222	80
BG, MGB		102
conc	140	79
brown GR		101
A		94
VX	564	84
BL		94
t 10B	528	82
e AFL		94
		94
3RX	754	87
		97
2R		97
TBO		102
A	283	80
5GX		102
ine G, 2G	606	85
yellowish	505	82
yellowish XX	505	82
ge R		102
w 2G, 5G		102
w GN, GR		102
	512	82
J	681	86
3R conc	649	86
ack AG		97
lue black 2BX		97
illiant blue BL		97
own 6G		97
een 3G		97
ive, B, D, 2G		97
ive brown G		97
olet B2R		97
lue	535	83
blue	537	83
e new	537	83
FB	515	82
00XE	515	82
3G		102
NNX	663	86
n extra yellowish	660	86
n B	660	86
n A		102
otrope	687	86
w H	618	85
G, R		94
	250	80
	293	80
GA, O, 3G	177	79
own G		94
V	627	85
CN		97
		97
pe	625	85

Name of dye	Schultz No.	Page
Modern olive IN		97
Modern royal blue	627	85
Modern violet	635	86
Modern violet N	624	85
Monochrome brown EF		97
Nako DR, 3GA, PS, RH	923	92
Nako DD, D2R, O black	923	92
Nako yellow SEL	923	92
Naphthalene blue black		94
Naphthalene green, V	564	84
Naphthamine blue JEF	338	81
Naphthamine fast black KS		100
Naphthamine green AG		100
Naphthamine green AN	475	82
Naphthamine light blue 4B		100
Naphthamine light brown 2G		100
Naphthamine light green G		100
Naphthamine light red R		100
Naphthamine light violet 2B		100
Naphthamine pink 2B		100
Naphthamine violet BE	326	81
Naphthindone BB	126	79
Naphthochrome blue BN		97
Naphthochrome cyanine R		97
Naphthochrome green G		97
Naphthochrome violet 4B		97
Naphthochrome violet 2R	636	86
Naphthogene blue B		100
Naphthylamine black 4B	217	79
Naphthylamine black 6B	266	80
Naphthylamine brown	160	79
Neolan black, 2G		94
Neolan blue B, 2G		94
Neolan green B		94
Neolan gray B new		94
Neolan navy blue 2G, R		94
Neolan pink B, G		94
Neolan red R		94
Neptune blue BGX	543	83
Neptune blue BXX	545	83
New ethyl blue BS		102
New fast gray	681	86
New methylene blue N, NX	663	86
New methylene blue NNX, NSS	663	86
Night blue	560	84
Night blue greenish D	560	84
Night green A	503	82
Nigrosine T, W, WLG	700	86
Nile blue BX	653	86
Nitranil brown B, R, S		101
Nitranil green B		101
Nitrosamine red	56	78
Nitrosine pdr		97
Oil blue Z		102
Oil brown AN		102
Oil green ALB		102
Omega chrome brown G, PB		97
Onis 3B, 5B		93
Orange 2G	38	78
Oxamine acid brown G		94
Oxamine black BBN, BBNX		101
Oxamine black BHN	333	81
Oxamine fast blue 6B, RR, RRX		101
Oxamine fast pink BX		101
Oxamine light red ESB		101
Oxamine red 3BX, X	346	81
Oxychrome blue black BG		97
Oxydiaminogene		101
Palatine chrome brown GGX	154	79
Palatine chrome brown RX, W	154	79
Palatine chrome brown WRNTX	154	79
Palatine light yellow RX		94
Palatine scarlet A	81	78
Paper fast bordeaux B		102
Para blue 2BX		101
Paranil black 2B		101
Parasulphon brown B, V		101
Patent blue A	545	83
Patent blue V	543	83
Patent dianil black FF	436	81
Patent green AGL	503	82
Patent marine blue LE	543	83

Index to table of imports—Continued

Name of dye	Schultz No.	Page
Patent phosphine G	606	85
Patent phosphine 2G	606	85
Patent phosphine R (I)	606	85
Patent phosphine R (B)	608	85
Patent phosphine 2R	608	85
Patent phosphine GRNTN	608	85
Patent phosphine RRDX	608	85
Permanent red 4B	152	79
Philadelphia yellow 2G	606	85
Phosphine O, 3R	606	85
Phosphine brown L		102
Phosphine orange		102
Pigment black extra		102
Pigment chrome yellow L	21	78
Pigment purple A	93	78
Pilatus light yellow RX		94
Pinatype complement red D		102
Pluto brown 2G		101
Plutoform black BL, 3GL		101
Polar maroon VC		94
Polar orange R		94
Polar red G, R, RS, 3B		94
Polar yellow 2G, 5G		94
Pure blue 2G	537	83
Printing violet BD		97
Printing red		102
Pyramine orange 3G	306	80
Pyramine orange R	360	81
Pyrazol orange G	392	81
Pyrazol orange R, RR		101
Pyrogene brown DTB		101
Pyrogene cutch brown 2R		101
Pyrogene direct blue RL	726	87
Pyrogene green 3G	746	87
Pyrogene indigo	735	87
Pyrogene indigo blue		101
Pyrogene violet brown X		101
Pyrogene yellow M	734	87
Pyronine G	568	84
Quinoline yellow	613	85
Quinoline yellow (spirit-soluble)	612	85
Quinoline yellow KT, N, O	613	85
Radio brown B		94
Radio red G		94
Radio yellow R		94
Red IB, JB	240	80
Red violet HR		102
Rheonine AL, GD	607	85
Rhodamine B	573	84
Rhodamine 3B	574	84
Rhodamine G, 3R	572	84
Rhodamine 4GD, 4GDN		102
Rhodamine 6G, 6GD	571	84
Rhodamine 6GDN, 6GH	571	84
Rhoduline blue GO, 3GO		102
Rhoduline orange N, NO	603	84
Rhoduline sky blue 3G		102
Rhoduline yellow 6G, 6GT	618	85
Rosanthrene orange R		101
Rosanthrene pink		101
Rosazeine B extra	573	84
Rose bengale B	597	84
Rosinduline 2B bluish	673	86
Rosolane	688	86
Rosolane O	687	86
Safranine	679	86
Scarlet RR		94
Setoglaucine	496	82
Setopaline	500	82
Silk blue BIC (A)		94
Silk blue BSIC	539	83
Silver gray P	700	86
Sitara fast red RL	73	78
Solamine blue FF		99
Soluble blue T	539	83
Special blue G		94
Spruce red B		94
Stanley red	193	79
Stone fast orange R		102
Stone fast yellow 2G, 5G		102
Stone fast yellow GN, GR		102
Sulphide violet V		101

Name of dye	Schultz No.	Page
Sulpho rhodamine B	579	84
Sulpho rosazeine BG	579	84
Sulphon acid brown 2R		94
Sulphon orange G		94
Sulphon yellow 5 G		94
Sulphur brilliant blue CLB		102
Sulphur yellow G	712	87
Sumazine blue		102
Sun yellow G	9	79
Supramine black BR		94
Supramine brown R		94
Supramine red B, 2G		94
Supramine yellow G, R		94
Tannin heliotrope	685	86
Tannin orange R	74	78
Tannoflavine T	618	85
Tero black FB		102
Tero brown, FR		102
Tero carmine FB		102
Tero red FG		102
Tero yellow FR		102
Tetra cyanol A	545	83
Tetra cyanol V	543	83
Thiazol yellow 3G	198	79
Thioflavine T, TCN	618	85
Thiogene black MA	720	87
Thiogene new blue 2RL		101
Thiogene violet V		101
Thioindigo brown R	902	92
Thioindigo brown G	904	92
Thioindigo orange R	913	92
Thioindigo orange RY	913	92
Thioindigo pink AN, BN	910	92
Thioindigo pink RN		92
Thioindigo red 3B	918	92
Thioindigo rose RN		92
Thioindigo scarlet 2G	907	92
Thioindigo violet 2R		92
Thioindigo violet 5R		92
Thioindigo yellow 3GN	913	92
Thional brown G	747	87
Thional yellow GG		102
Thionine blue G, GO	661	86
Thionine blue GO old	661	86
Thionol black XXN		102
Thionol brown O, R		102
Thionol purple B		102
Toluylene fast brown 2R		101
Toluylene fast orange GL	302	81
Toluylene red, OO	338	81
Triazol light blue 4GL		102
Trizaol pure blue 6B		102
Trizaol red 3B	339	90
Trisulphon brown B	449	81
Trisulphon brown GG	457	81
Trisulphon violet B	322	80
Turquoise blue BB, G	696	86
Typophor black FB		102
Typophor brown FR		102
Typophor carmine FB		102
Typophor red FG		102
Typophor yellow FR		102
Ultra brown R		97
Ultra cyanine RB	644	86
Ultra cyanol B		97
Ultra orange R	58	78
Ursol D, SO	823	92
Vat black BB	765	87
Vat blue green B	760	87
Vat brilliant violet RR, RRP	767	87
Vat brilliant violet RK	820	92
Vat brown G		92
Vat golden orange G	780	87
Vat gray K	834	92
Vat gray 6B	921	92
Vat heliotrope R	828	92
Vat olive R	833	92
Vat orange R		92
Vat orange RRT	783	87
Vat orange 4R	782	87
Vat red 5GK	816	92
Vat red violet RH	918	92

Index to table of imports—Continued

ıe of dye	Schultz No.	Page	Name of dye	Schultz No.	Page
RK		96	Wool fast orange G		94
		96	Wool fast red BL		94
	817	89	Wool fast yellow 3G		94
	810	88	Wool green S	566	84
		96	Wool jet black 3B	220	79
	283	80	Wool printing black CUI		94
	283	80	Wool red G		94
	559	84	Wool violet RC		94
	522	82	Xylene blue VS	507	82
	497	82	Xylene fast blue AE		94
ıe BO	559	84	Xylene fast green B	564	84
BS	61	78	Xylene light yellow 2G	22	78
	580	84	Xylene light yellow R	22	78
	636	86	Xylene milling red B		94
	514	82	Yellow IG, JG	222	80
	539	83	Yellow II		102
F	220	79	Yellow T	618	85
	220	79	Zambesi black, D, V		101
		94	Zambesi brown 4R	330	81
B	565	84	Zambesi pure blue 4BG	274	80
	562	84	Zapon blue R		102
L		94	Zapon violet R		102
L		94			

PART IV

NSUS OF SYNTHETIC ORGANIC CHEMICALS OTHER THAN THOSE OF COAL-TAR ORIGIN, 1923

CENSUS OF SYNTHETIC ORGANIC CHEMICALS OTHER THAN THOSE OF COAL-TAR ORIGIN, 1923

Introductory

The United States Tariff Commission has compiled a census of the production of synthetic organic chemicals for the year 1923. A similar census, made for the first time in 1921, has been repeated each year. The quantity of production and the amount and value of the sales have been given in all cases where the figures could be published without disclosing the operations of the individual producer.

The products included in this census are synthetic organic compounds derived from sources other than coal tar. Aliphatic compounds derived from natural sources by isolation, distillation, extraction, hydrolysis, or purification, as for example, alkaloids, constituents of essential oils, sugars, and acids, such as stearic and tartaric, are not included, nor are cyanides, cyanamides, or carbides of metals or inorganic radicals. Statistics for products obtainable from other sources have been excluded in most cases.

As the Bureau of the Census collects data for the more important non-coal-tar organic compounds, the Tariff Commission has not attempted to collect statistics on such, except in a few instances where the importance of the industry or other conditions appeared to warrant this departure.

The production in 1923 of synthetic organic chemicals other than those derived from coal tar was 90,597,712 pounds, compared with 79,202,155 pounds in 1922. Sales in 1923 amounted to 67,727,067 pounds, valued at $13,875,521. This total includes the production of research chemicals, sales of which amounted to 437 pounds, valued at $7,930, or $1.81 per pound.

Developments in the Industry

Previous to the World War the United States produced a few synthetic organic chemicals other than those of coal-tar origin. Among these were acetone, chloroform, ether, acetic acid, formaldehyde, acetaldehyde, amyl acetate, and vanillin. Although few in number, the chemicals of this group required large scale production.

Shortly after the outbreak of the war the manufacturers of finished perfumes, flavors, pharmaceuticals, and other products, who had been dependent upon imports of fine chemicals from Germany, were confronted with a serious situation. The American manufacturers who then undertook to supply these products have since developed an industry not only of considerable size but the source of most of the synthetic organic chemicals consumed in the United States.

Synthetic aromatic chemicals.—The synthetic aromatic chemical industry is a source of supply of raw materials for the flavor and perfume industries. The past year (1923) was probably one of the

TABLE 17.—*Production and sales of synthetic organic chemicals, 1923*—Continued

Name	Manufacturer's identification number according to list on p. 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Anethol	75, 79, X	573	$636	$1.11	[illegible]
Anisic acid	79				
Aubepine (anisaldehyde)	24, 75				
Barbital (veronal) (diethylbarbituric acid).	1, 17, X	9,116	176,960	19.41	
Barbital sodium	17				
Borneol	69, 137				
Brometone (tribromotertiarybutyl alcohol).	X				
Bromodiethylacetylcarbamide	17				
Bromocamphor	62, 118				
Bromoform	62				
Butanol (n-butyl alcohol)	29, 43				
sec.-Butyl alcohol	X				
Butyl acetate (n, and sec.)	10, 63, 75, 79, 117, 127, 141, 191, 193, X.	351,041	151,673	.43	1,956,000
n-Butyl bromide	68				
Butyl butyrate	79				
n-Butyl iodide	68				
Butyl propionate	79				
Butyraldehyde	29, 43				
n-Butyric acid	72, 79, 141				29,369
Butylxanthic disulphide	X				
d-Camphoric acid	118				
n-Caproic acid	75, 141				
Carbon tetrachloride	62, 139, 200, X	11,007,361	874,281	.08	13,313,000
Chaulmoogric ester	17				
Chloroacetyl chloride	62				
Chloral hydrate	124, X				
Chloretone (trichlorotertiarybutyl alcohol).	X				
Chloroacetic acid (mono)	62, 63				
Chloroform	62, 139, 160, X	1,442,479	355,319	.25	1,595,250
Chlorodimethyl ether	17				
Chloro-theophylline	17				
Cinnamyl alcohol	75				
Cinnamyl ketone	75				
Cinnamyl valerate	75				
Citronellol	75, 103, 194				
Citronellyl acetate	75, 178, X				30
Crotonaldehyde	29				
Crotonic acid	29				
Cyanacetic acid, sodium salt	17				
Decyl alcohol	75				
Decyl aldehyde	75				
Dibromin (dibromomalonylureide)	X				
Dibromobehenate of calcium	17				
n-Dibutylamine	1				
Dichloroacetic acid	62				
Dichloroethylether	29				
Dichloromethane	62				
Dichloropentanol	17				
Diethylacetic acid	17				
Diethylamine	1, 205				
Diethylaminoethyl alcohol	205				
Diethylbromoacetyl bromide	17				
Diethyl malonate (malonic ester)	1, 17				
Diethyl sulfate	29				
Dihydrovanillone	75				
Dihydroxycitronnellic ketone	75				
Dihydroxytartaric acid	27, 88, 151, 205				100,000
Diiodohydroxypropane	17				
Dimethylamine	205				
Dimethylglyoxime	68, 111				
1:3-Dimethylxanthine	17				
1:3-Dimethylxanthine sodium acetate.	17				
Disodiummonoethylarsone	X				
Duodecyl alcohol	75				
Duodecyl aldehyde	75				
Erucic acid	17				
Ethyl acetate, 85 per cent	10, 63, 72, 75, 117, 127, 129, 191, 193, 194, X.	16,970,972	1,996,217	.11	25,987,720

Production and sales of synthetic organic chemicals, 1923—Continued

ame	Manufacturer's identification number according to list on p. 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
e	191				
	79				
	79				
	17, 62, 118, 194, 205			$0.39	124,842
	24, 72, 75, 79, 141, 191, 194, X, X.	40,791	$51,881	1.27	40,477
	141				
	75, 191				
	48, 62, 78, 83, 118, 160, 191, X, X.	219,594	68,506	.31	270,180
te	62, 191				
	194				
l, ethyl ester of	X				
	48, 63, 118, 153, 174, 191.	4,666,832	554,208	.12	5,104,157
	75, 79, 118, 141, 191, X.	2,016	1,220	.61	1,968
l ester of menthol	17				
	68, 118, 124, 153, 179.	226	1,234	5.46	261
	75, 141, 191				
	75, 191				
	75				
nono)	1, 75				
	118, 153, X	29,946	15,428	.52	35,140
	75, 79, 141, 194, X.	3,965	6,942	1.75	3,476
	17, 75, 191, 194				
	24, 75, 79, 129				823
	72, 75, 194, X			1.81	1,869
	72, 75, 194, X				
	191				
	62, 118				
ydrin	29, 62				
	29, X				
de	62				
de	29, 62				
	29				
	29				
	68, 93, 127, 142, 149, X.	18,854,535	2,474,506	.13	24,081,188
r cent	196				
	156				
	68, 118, 208	161,399	88,342	.55	468,941
	75, 79, 129, 178, X				
	75, 103, X	20	126	6.26	
	75, 103, 178, X	22	129	5.86	
te	75				
etate	75				
orohydrin	68				
c acid and salts of	142, X				
	29				
	75				
etate	75				
	24, 75, 78, 192, X	12,914	24,572	1.90	11,696
yde	75				
	75, 79, X				
monia	X				
	79				
	75				
amine	X				
iorphine)	118, 136, 153	1,000	118,433	118.43	
	29, 62				
	75				
de	75				
	75				
ramine	93, 142, 149, X	1,155,083	974,877	.84	1,381,073
etetramineanhy-itrate	17				
l	186, X				
alcium	17				
on basic	17				
	17				
	118, 124, 136, 153	12,179	63,758	5.24	13,231
	75, 103, 129, 192, 194, X	23,476	98,478	4.20	

TABLE 17.—*Production and sales of synthetic organic chemicals, 1923*—Continued

Name	Manufacturer's identification number according to list on p. 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Isoamyl acetate	141				
Isoamyl butyrate	24, 75, 79, 141, 191, X, X.	9,362	$13,189	$1.41	[illegible]
Isoamyl formate	75, 79, 141, 191			1.20	[illegible]
Isoamyl nitrite	68				
Isoamyl n-valerate	72				
Isoamyl isovalerate	75, 79, 141, 191, X.	399	1,196	3.00	[illegible]
Isobutyl acetate	75, 79, 141, 191	83	274	3.30	[illegible]
Isobutyl alcohol	103				
Isobutyl butyrate	75, 141, 191	12	34	2.83	
Isobutyl formate	75, 191				
Isobutyl isobutyrate	79				
Isobutylpropionate	75				
Iso butyraldehyde	75				
Iso butyric acid	79, 141				
Isoeugenol	24, 75, 103, 192, 195, X.	2,063	9,502	4.61	
Isopropyl acetate	75				
Isopropyl alcohol (Isopropanol)	29, 144, X				
Isopropyl chloride	144				
Isopropyl oxalate	191				
Isovaleric acid	79, 141, 176				
Jasmone ketone	75				
Lactic acid	197				
Limonene alcohol	194				
Linalyl acetate	75, 103, 178, 192	453	3,570	7.88	[illegible]
Linalyl butyrate	75				
Linalyl formate	75, 178, 192				
Linalyl propionate	75				
Linalyl valerate	75				
Methaform (chlorobutanol)	X				
Methyl acetate	79, 127, 191				
Methylamine	205				
Methyl anisate	79				
Methyl bromide	62				
Methyl n-butyrate	75, 141, 191				
Methyl chloride	X				
Methyl eug nol	75, 178				
Methyl for ate	191				
Methyl iodide	179				
Methyl isoeugenol	178				
Methylnonylacetic aldehyde	75				
Methyl oxalate	75, 191				
Methyl propionate	75				
p-Methyl quinoline	75				
Methyl sulfate	X				
Methyl xanthic acid, ethyl ester of	X				
Methylene citric acid	17				
Nerol	194				
Nonyl alcohol	75				
Nonyl aldehyde	75				
Octadecyl alcohol	75				
Octadecyl aldehyde	75				
Octadecyl ketone	75				
Octoic alcohol	178				
sec-Octyl acetate	75, 192				
n-Octyl alcohol and sec-octyl alcohol (caprylalcohol)	75, 179, 192				[illegible]
Octyl aldehyde	75, 103				
Octyl formate	178				
Oxalic acid	143, 196				
Paracetaldehyde	29, 110				
Pentachloroethane	29, 62				
Paraformaldehyde	93, 142, 149	117,506	57,670	.49	[illegible]
Piperonone (piperinic ketone)	75				
Piperonone vanillone	75				
Potassium ethyl xanthate	X				
Potassium methyl xanthate	X				
Propionaldehyde	75				
Propionic acid	72				
n-Propyl acetate	75				
n-Propyl alcohol	144				
n-Propyl n-butyrate	191				
n-Propyl isovalerate	191				
Propyl oenanthate	75				
n-Propyl propionate	75				

'.—*Production and sales of synthetic organic chemicals, 1923*—Continued

Name	Manufacturer's identification number according to list on p. 195	Sales			Total production
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
hlorohydrin	29				
ichloride	29				
lycol	29				
xide	29				
pyrogallic acid)	68, 118, 208	222,929	$218,066	$0.98	235,389
l	27				
	75, 103, 129, 178, 186, 192, 194.	2,985	43,558	14.69	5,729
etate	75, 178				
utyrate	75				
rmate	178				
ydride	X				
ate (tannigen)	17				
	137, 192, X, X	260,318	129,430	.50	322,337
e	X				
rate	153, 195				
etate	75, 79, 103, 129, 178, 192, X.	7,655	11,250	1.47	13,638
ityrate	75				
ethylene	62				
hloroethane	62				
alcohol	75				
aldehyde	75				
ketone	75				
lead	63				
ldiaminopentanol	17				
	79, 129, 191				
ylene	29, 62				
nethylenetriamine	X				
ne bromide	1				
id	72				
l	75				
hol	75				
	78, 79, 122, 195, X, X.				269,941
nillate	75				
anthate	X				
nthetic organic chemicals	111				
emicals	54, 68, 173	437	7,930	1.81	

vanillin reported by one firm under coal-tar flavor.

3.—*Comparison of production of synthetic organic chemicals, 1922 and 1923*

Name	1923	1922
	Pounds	*Pounds*
te	3,207,022	1,692,074
te (n. and sec.)	1,816,086	2,467,506
achloride	13,513,644	11,166,318
acetate	99	105
te (85 per cent)	25,857,720	16,114,458
ide	124,842	155,162
rate	40,477	22,958
ide	270,180	164,198
	5,104,157	4,017,043
ate	1,958	1,627
e	261	238
thate	3,476	4,731
gonate	823	971
rde	24,081,188	23,958,152
	469,941	411,768
	11,696	6,794
enetetramine	1,381,073	2,015,161
	13,231	11,811
yrate	9,733	5,576
nate	84	155
tate	111	510
ate	238	736
hol and sec. octyl alcohol	45	106
	235,389	187,536
	5,729	777
etate	13,638	13,802
	269,941	221,046

TABLE 19.—*Imports and production of synthetic organic chemicals (except those of coal-tar origin), 1922, 1923*

Name	Imports, 1922		Production 1922	Imports, 1923		Production 1923
	Pounds	Value	Pounds	Pounds	Value	Pounds
Acetaldehyde	82,390	$13,192	71,537	163,913	$26,338	
Acetic or pyroligneous acid	18,706	1,318				
Containing by weight not more than 65 per cent acetic acid	43	19		37,052	4,758	
Containing more than 65 per cent acetic acid				664,034	79,553	
Formic acid	278,141	20,481		1,282,004	96,174	
Gallic acid	4,490	2,387	411,768	6,048	2,743	
Glycerophosphoric, and salts and compounds	12,481	8,659		28,265	38,100	
Lactic acid	380,840	37,913				
Containing by weight 55 per cent or more of lactic acid	5,000	758		66,648	16,056	
Oxalic acid	1,290,075	106,486	3,978,807	2,621,302	206,100	
Pyrogallic acid	1	3	187,536	342	417	
Methanol	[1] 27	43	[1] 6,808,911	[1] 15,786	12,373	
Carbon tetrachloride	66,131	1,854	11,166,318	1,429	130	
Chloroform	15	3		381	133	
Chloral hydrate	1,354	1,186		6,135	1,819	
Cocaine, etc	[2] 7,518	18,572		[2] 100	238	
Ethers and esters:						
Containing not more than 10 per cent alcohol—						
Ethyl ether	906	138	[2] 4,017,043	[2] 103	75	
Ethyl chloride	17,096	10,906	[2] 164,198	[2] 9,519	11,899	
Amyl acetate	200	258	[2] 1,692,074	[2] 26,418	9,612	
Amyl nitrite	6	17		56	114	
Ethyl acetate	200	276	[2] 16,114,438	[2] 27,202	11,664	
Nitrous, spirits of	1,998	1,365				
Other, n. s. p. f	4,374	1,781		11,448	6,458	
Containing more than 50 per cent alcohol	1,616	1,442		668	1,436	
Formaldehyde solution (not more than 40 per cent)	407	67	23,958,152			
Formaldehyde solution (formalin)	300	50		166	67	
Hexamethylenetetramine	16,010	7,765	2,015,161	47,373	24,722	
Urea	260,636	61,561		47,711	5,898	
Thymol	11,403	34,426		12,136	27,067	
Vanillin	[2] 3,514	1,448	221,046			

[1] Gallons. [2] Ounces. [3] Alcohol content unknown.

PART V

INTERNATIONAL DYE TRADE

PART V

INTERNATIONAL DYE TRADE

INTRODUCTORY

In the census of 1922 the world's trade in synthetic dyes was the subject of discussion. This included a review of the conditions existing before the war, when Germany dominated the world trade, and a consideration of manufacturing developments during and since the war, as a result of which the United States, Great Britain, France, and Italy have established home dye industries producing a great part of the requirements of each country and which have to some extent developed an export trade in dyes. The dye industries of Great Britain, Switzerland, and France were considered in detail. Available statistical information from official sources on production, consumption, imports and exports of dyes by different nations was also included in Part V, International Dye Trade.

GENERAL DEVELOPMENTS DURING 1923

The occupation of the Ruhr.—The occupation of the Ruhr by the French during 1923 had a pronounced effect on the international dye trade through the partial elimination, for some months of that year, of active competition by German dye manufacturers. The total output of dyes in the German factories in January, 1923, was at the rate of 240,000,000 pounds per year or approximately 85 per cent of the output in 1913. The monthly production figures of the German dye plants declined from January to May, when they reached a minimum output for that year, being at the rate of about 35 per cent of the 1913 output. Then, from June until December, each month registered a gain in production, the rate in the latter month being equivalent to nearly 185,000,000 pounds per year. The total production of 1923 (144,859,572 pounds) was smaller by 47,946,992 pounds than the 1922 output, which had amounted to 192,806,564 pounds. This decrease represents a significant portion of the world's total annual consumption. The requirements of China, India, and other large nonmanufacturing consumers were in part met by the United States, Great Britain, France, and Switzerland, as is apparent from the official dye statistics of those countries. The exports of the United States increased in 1923 to 17,924,200 pounds, valued at $5,565,267, from a 1922 total of 8,344,187 pounds, with a value of $3,996,443. The exports of dyes similarly increased in the United Kingdom, totaling in 1923, 14,132,944 pounds, valued at $4,719,924, compared with 5,299,504 pounds, valued at $2,714,612, in 1922. The exports during 1923 of both the United Kingdom and the United States fell below those of 1920, a year of world-wide business activity, before German dyes had reappeared in the world's markets. Germany's monthly production figures for January and February, 1924, show an output at the rate of nearly 190,000,000

pounds per year. This expansion in production is obviously a factor in the world's large dye markets, such as the Far East countries, and will probably affect exports of dyes from the United States and Great Britain. The output of the early months of 1924 indicates that the effects of the Ruhr occupation, which extended from the early part of 1923 to the latter part of the year, have very largely disappeared.

Seizure of German dyes by French and Belgian authorities.—According to reports from France, 6,560 tons of dyes were seized in May, 1923, in the dye plants at Höchst, Ludwigshafen, and Biebrich. Of this total, 2,100 tons were sold in order to pay sums due the German Coal Syndicate by the German dye concerns from which the dyes were taken. It is understood that the remaining 4,460 tons were to be divided between France and Belgium. A portion of the first dye seizure was resold for exportation. Later seizures were reported to consist of pharmaceuticals and chemicals.

Indigo and alizarin red comprised a large portion of the seized stocks. The British Alizarin Company purchased alizarin in quantity in order to prevent the demoralization of price levels by the dumping of this dye on the market. The official import figures for the United Kingdom show a total of 1,445,024 pounds of alizarin, valued at $391,535, for the month of January, 1924. This amount exceeded by 503,216 pounds the total imports of alizarin during the entire year 1923.

Increased post-war capacity to produce dyes.—The combined capacity of the world's synthetic dye plants in 1924 is estimated to exceed 600,000,000 pounds per year, or nearly double the pre-war capacity. In arriving at this estimate the capacity of the seven leading dye-producing nations has been used. In addition, there is probably productive plant capacity in Austria, Czechoslovakia, Belgium, Holland, Sweden, Russia, and possibly other countries, but the aggregate of these minor producers will, it is believed, not seriously affect this estimate. The estimated capacity for the first seven countries given in the following table was obtained by adding 25 per cent to the maximum reported or estimated output.

The existing capacity to produce in excess of normal requirements can not fail to result in an era of severe competition in the world's markets, and will finally eliminate many of the plants now producing dyes.

TABLE 20.—*World's estimated annual capacity to produce dyes*

Country	Maximum reported or estimated output	Estimated annual capacity
	Pounds	*Pounds*
Germany [1]	280,000,000	350,000,000
United States [2]	94,000,000	117,500,000
Great Britain [3]	43,000,000	54,000,000
Switzerland [3]	24,000,000	30,000,000
France [4]	24,000,000	30,000,000
Italy [5]	10,000,000	12,500,000
Japan [4]	16,000,000	20,000,000
Total	491,000,000	614,000,000

[1] For the year 1913, exports totaled 239,598,133 pounds and home consumption is estimated at 40,000,000 pounds.

[2] For 1923. [3] For 1920. [4] For 1923. [5] For 1922. [6] For 1919

The following tables show exports from the principal dye-producing countries and imports into the chief dye-consuming countries:

TABLE 21.—*Exports of coal-tar dyes from chief producing countries, 1913, 1921–1923*

Exported from—	1913		1921	
	Pounds	Value	Pounds	Value
Germany	239,598,133	$51,689,400	[1] 48,304,991	[1] $15,935,585
United States				[4] 6,270,139
Great Britain	5,451,376	862,566	7,621,600	5,033,828
Switzerland	19,458,902	5,549,752	10,779,612	11,654,516
France	1,152,134	275,716	5,947,131	1,608,308
Italy	111,725	22,458	607,812	274,128

Exported from—	1922		1923	
	Pounds	Value	Pounds	Value
Germany	114,213,300	$79,826,618	73,974,473	[2] $41,580,742 [3] 17,125,528
United States	[5] 8,344,187	[5] 3,996,443	[5] 17,924,200	[5] 5,565,267
Great Britain	3,860,416	2,300,298	14,132,944	4,719,924
Switzerland	16,167,655	13,042,635	18,282,967	12,233,711
France	1,251,551	1,094,420	4,650,382	3,749,442
Italy	372,578	254,250	[6] 432,983	[6] 417,906

[1] May to December, 1921.
[2] 1923 basis.
[3] 1913 basis.
[4] Includes natural and coal-tar dyes, with exception of logwood extract.
[5] New classification for coal-tar colors adopted in 1922 was "Color Lakes" and "Other colors, dyes, and stains."
[6] First nine months.

TABLE 22.—*Imports of dyes into chief consuming countries, 1913, 1921–1923*

Imported into—	1913		1921	
	Pounds	Value	Pounds	Value
China	[1] 60,696,533	$11,673,779	46,939,187	$19,283,019
United States	[2] 45,950,895	7,537,870	4,252,911	5,156,779
Great Britain	41,203,008	9,207,684	6,686,288	5,930,054
Austria-Hungary	17,168,764	3,616,199	3,439,837	931,610
British India [3]	16,923,607	3,741,031	11,731,237	11,798,262
Italy	15,542,429	3,611,705	[4] 7,450,665	2,556,457
Japan	[5] 9,755,260	2,100,255	7,752,896	9,858,807
Germany	7,138,495	1,682,422	[5] 291,457	33,497
Russia	4,835,647	3,701,186		
France	4,706,601	1,416,316	2,531,320	1,539,907
Canada [3]	2,633,516	594,414	2,366,855	1,692,873
Turkey	2,631,703	641,321		
Sweden	2,376,166	699,737	984,028	851,265
Spain	[7] 2,303,709	1,021,368	3,178,365	1,264,929
Switzerland	2,201,292	431,197	1,084,337	668,843
Dutch East Indies	[5] 2,073,434	890,366	2,166,053	1,385,364
Czechoslovakia			10,854,128	6,901,737
Netherlands			2,666,518	1,937,097

[For footnotes see next page.]

TABLE 22.—*Imports of dyes into chief consuming countries, 1913, 1921–1923*—Continued

Imported into—	1922		1923	
	Pounds	Value	Pounds	Value
China	56,300,385	$17,788,624		
United States	3,982,631	5,243,257	3,698,183	[illegible]
Great Britain	6,490,192	5,873,100	6,289,584	4,[illegible]
Austria-Hungary	2,760,380	817,737		
British India	14,119,822			
Italy	[4] 5,484,383	2,751,374		
Japan	12,526,817	9,025,223		
Germany	1,003,300	111,906	486,494	[illegible]
Russia				
France	[7] 3,279,786	2,778,480	3,022,505	2,[illegible]
Canada	3,290,349	2,287,130		
Turkey				
Sweden				
Spain	2,115,627	1,777,938		
Switzerland	1,290,793	672,769	1,980,171	[illegible]
Dutch East Indies	2,091,102		2,238,258	
Czechoslovakia	7,826,320	5,765,175	5,118,341	2,[illegible]
Netherlands	3,816,162	2,124,263		

[1] Exports to China, 1913, from France, Germany, and Switzerland amounted to 89,183,230 pounds, valued at $11,516,567. Chinese statistics show value but not quantity of aniline dyes, and include "unclassified dyes," which may contain other than coal-tar dyes.
[2] Fiscal year 1914—Quantity from Special Agents Series No. 121; value from Commerce and Navigation Reports.
[3] Years ended March 31, 1914, and 1922 and 1923.
[4] Figures include 3,496,275 pounds of reparation dyes for which no value is shown.
[5] Aniline only, in 1913.
[6] 1921 imports, May to December.
[7] 1914.
[8] Quantity of synthetic indigo not shown, 1913.
[9] Figures include 1,666,237 pounds of reparation dyes for which no value is shown.

GERMANY'S POSITION IN THE WORLD'S DYE TRADE

Of primary importance in a consideration of international dye trade is the pre-war supremacy of Germany and her recent efforts to regain her lost trade.

The chemical industry is one of the leading industries of Germany. Its vital place in the welfare of the country is fully appreciated and the severe loss of trade in dyes and chemicals as a result of the war can not be considered as permanent.

The organization and growth of the dye industry in Germany up to the outbreak of the war has been described in great detail in many technical publications. Accordingly, mention is made here only of the more important influences which have favored the expansion of the German industry, together with statistics of the exports of dyes from 1880 to 1913, demonstrating the remarkable rate of their growth.

The coal-tar dye industry was established in England and France several years before it was started in Germany. Professor Hoffman and other German chemists who had resided in England were thoroughly familiar with the initial work on these dyes carried out in the Royal College of Chemistry and in other English institutions. They returned to Germany, to find the significance and promise of the coal-tar dye and chemical industry fully appreciated. The value of research was, from the start, recognized by the German universities, the Government, and the industrial firms. This probably more than any other factor favored the rapid growth and development of the

ustry. Other vital factors in the growth of this chemical branch e (1) the heavy capital investment; (2) the availability of raw terial; (3) the concentration within a small area; (4) the fact that ign patent laws in consuming countries, such as France, Great tain, and the United States, were unfavorable to the establish- nt of domestic dye industries, but favorable to German ownership patents; and (5) the intimate relationship between different con- ns which resulted, in recent years, in the formation of a powerful st.

PRE-WAR TRADE

Prior to the war German dye manufacturers succeeded in eliminat- any serious foreign competition, using to that end such methods price cutting, full-line forcing, and dumping.

n 1913, the total exports of dyes reached a maximum, 239,598,133 nds; adding 40,000,000 pounds as the estimated home consump- n, total production during that year approximated 280,000,000 nds. As Germany then dominated the world's market an lysis of official dye-export figures throws much light on the world's trade at that time. Table 23 shows total exports of dyes from many in 1913 for the first 10 importing countries both by quantity value.

ABLE 23.—*Exports of coal-tar dyes from Germany to leading countries, 1913*

Exported to—	Pounds	Exported to—	Value
	65, 743, 387	China	$10, 957, 190
d States	44, 030, 272	United States	9, 027, 780
Britain	32, 744, 924	Great Britain	6, 617, 240
a-Hungary	16, 933, 533	Austria-Hungary	3, 787, 380
India	15, 008, 916	Japan	3, 453, 900
	10, 908, 360	British India	3, 168, 060
	9, 744, 333	Italy	2, 524, 920
am	5, 531, 341	Russia	1, 929, 420
rlands	5, 072, 785	France	1, 524, 480
e	5, 055, 148	Belgium	1, 405, 380

able 24 shows exports by countries for the year 1913, giving value quantity for the three following classes of synthetic dyes, "ani- and other coal-tar dyes, not elsewhere mentioned," "alizarin, arin dyes and anthracene dyes," and "synthetic indigo."

TABLE 24.—*Exports of coal-tar dyes from Germany, 1913*

	1913			1913	
	Pounds	Value		Pounds	Value
arin, alizarin red, vari- ated colors from anth- ene:			Alizarin, alizarin red, vari- egated colors from anth- racene—Continued.		
Alsace-Lorraine			Sweden	127, 867	$47, 640
France	489, 421	$190, 560	Switzerland	661, 380	95, 280
Great Britain	5, 857, 622	976, 620	Spain	50, 700	23, 820
Italy	416, 669	119, 100	British India, etc	5, 866, 441	905, 160
Netherlands	716, 495	119, 100	Japan	205, 028	95, 280
Austria-Hungary	1, 192, 689	333, 480	East Indies, etc	1, 298, 509	238, 200
Austria			United States	5, 855, 418	1, 310, 100
Czechoslovakia			Total	24, 338, 784	5, 145, 120
Russia	725, 313	428, 760			

TABLE 24.—*Exports of coal-tar dyes from Germany, 1913*—Continued

	1913	
	Pounds	Value
Aniline and other coal-tar dyes not specifically mentioned:		
Belgium	5, 531, 341	$1, 405, 38
Bulgaria	384, 393	71, 460
Alsace-Lorraine		
France	3, 853, 641	1, 024, 260
Great Britain	24, 285, 874	5, 259, 500
Italy	9, 032, 246	2, 167, 620
Netherlands	3, 009, 279	666, 960
Norway	595, 242	142, 920
Austria-Hungary	12, 740, 383	2, 977, 509
Austria		
Jugoslavia		
Czechoslovakia		
Hungary		
East Poland		
Portugal	921, 523	238, 200
Rumania	496, 035	119, 100
Denmark	806, 884	142, 920
Russia	2, 420, 651	833, 700
South Russia		
Baltic States		
Finland	520, 286	142, 920
Sweden	1, 986, 345	476, 400
Switzerland	1, 728, 406	500, 220
Serbia	211, 642	47, 640
Spain	1, 446, 218	428, 760
Turkey	963, 410	214, 380
British India, etc	8, 428, 185	1, 953, 240
China	18, 653, 121	4, 536, 994
Japan	7, 729, 328	2, 000, 880
Dutch East Indies	531, 309	119, 100
Argentina	350, 531	119, 100
Aniline and other coal-tar dyes not specifically mentioned—Continued.		
Brazil	1, 382, 284	$404, 9
Canada	976, 638	190, 5
Chile	123, 458	47, 0
Mexico	1, 197, 098	285, 8
United States	30, 544, 733	6, 717, 2
Other countries		
Total	141, 729, 823	33, 833, 8
Indigo:		
Alsace-Lorraine		
France	712, 686	308, 9
Great Britain	2, 601, 428	391, 1
Italy	1, 459, 445	238, 2
Netherlands	1, 347, 011	214, 3
Austria-Hungary	3, 000, 461	478, 4
Austria		
Czechoslovakia		
Hungary		
Russia	956, 796	666, 9
Spain	147, 708	119, 1
Egypt	976, 638	214, 3
British India, etc	714, 290	309, 9
China	47, 090, 256	8, 395, 9
Japan	1, 809, 977	1, 357, 7
East Indies, etc	2, 103, 188	357, 5
United States	7, 630, 121	1, 000, 4
Dutch Indies		
Other countries		
Total [1]	73, 530, 614	13, 685, 4

[1] Officially published totals do not check with items shown.

EXPORTS SINCE THE WORLD WAR

The establishment of dye industries in the United States, Great Britain, France, and Italy, able to supply most of the home requirements and, in addition, to enter the export trade to some extent, has resulted in the loss of a large part of Germany's export trade in dyes, as shown in the following table:

TABLE 25.—*Exports of coal-tar dyes from Germany, 1913, 1920–1923*

Year	Pounds	Value
1913	239, 398, 133	$52, 699, 1
1920	61, 140, 171	32, 002, 4
1921 [1]	48, 304, 991	15, 905, 2
1922	115, 974, 960	80, 791, 9
1923	73, 974, 473	[2] 41, 380, 7 [3] 17, 125, 5

[1] May to December. [2] 1923 basis. [3] 1913 basis.

Of the leading consuming countries which are now dye producers, the United States ranks first (rating second by quantity of the world's consumers and first by value). The recovery of this market is of great importance to Germany, as the United States now possesses a dye industry ranking second to that of Germany and not only supplies more than 90 per cent of its domestic requirements, but has

ted significant amounts of indigo, sulphur black, and other to Far East markets, a feature tending to prevent German nation in these markets. It is accordingly a logical move on art of Germany to seek to regain the United States market, at very great cost and over a prolonged period of effort.

EFFORTS TO REGAIN EXPORT TRADE

doubt is possible as to the determination of the "I. G." to n for Germany her former supremacy in the world's dye trade. e various methods open to her in the effort to accomplish this ose, the following appear to be of leading importance:

Affiliation with concerns in the new dye-producing countries to lish a foothold in them.

The exercising of influence in competing countries, either di- or indirectly through consumers, to bring about tariff changes tating a freer entrance of dyes into those countries.

By attacking the export trade of the United States, Great in, and France, to weaken the industry of those nations to the nt to which the export trade serves as a source of revenue and a ace of production, and thus to admit of more continuous opera- at lower manufacturing costs.

The use of propaganda directed against the new foreign in- ies and their products and favorable to the German organiza- and its dyes.

Commercial warfare, by such well-known methods as price ng, full-line forcing, and dumping.

filiations.—The new dye-producing nations, the United States, t Britain, France, Italy, and Japan, have adopted tariff measures nport restrictions calculated to protect and stimulate the pro- on of dyes in those countries. Germany has consequently not had access to the markets of these countries, which before the war dominated by German dyes.

e method open to Germany for establishing a foothold and ng the profits is to enter into an affiliation with one or more of arge dye producers, and to obtain control by purchase of the r portion of the stock carrying voting rights. In the event of protective measures being continued in those countries, Ger- y might find it advantageous to purchase outright an existing rican plant, or to establish new plants in the United States, e their processes could be conducted and their trade secrets ned exclusively in the hands of German agents. A price-cutting paign might be resorted to for the purpose of forcing some of the ing concerns out of business.

aly.—The Germans have established themselves in Italy by ation. The Bianchi Co., one of the largest Italian producers, is ted to have an agreement with the Cassella Co. of Germany, r which the Germans agree to supply technical assistance and nnel, and the Italians in turn agree not to sell any products so uced outside of Italy or its colonies. The profits are divided on basis of the relative German and Italian stock ownership. The t of this affiliation is (1) to diminish the volume of Italian dyes in export market; (2) to effect a sharing of profits in the Italian e market by the "I. G.," and (3) to enable the exercise of Ger- influence in Italy.

France.—An arrangement between the French dye concern Materies Colorantes, and the "I. G." was reported in 1922. The Germans are understood to have agreed to furnish technical aid in return for the French undertaking to restrict exports to their colonies. The complications of the Ruhr occupation are reported to have unfavorably affected the operation of this agreement.

Great Britain.—Negotiations were conducted in 1923 between the British Dye Corporation and the "I. G.," but no working agreement had been reached to June, 1924.

The United States.—In 1923 and 1924 it was reported that endeavors were being made by German manufacturers to secure affiliations with certain firms in the United States. Up to June, 1924, however, no authoritative statement in regard to the conclusion of such agreements had been published.

Attack on the export trade of the United States, Great Britain, and France.—The export trade comprises nearly nine-tenths of Germany's dye business. In the case of the new dye-producing nations it has been a minor part of the total trade, as the home market demands made up the bulk of the business. Nevertheless, the dye export trade for the new industries in the United States and Great Britain constitutes an important balance for stabilizing production by offsetting the fluctuations of home consumption. Furthermore, as the output increases, the unit cost of production declines.

The destruction by Germany of the dye export trade of the United States, Great Britain, France, and Italy would be an important step in a program to weaken the new industries. The existence of competition in the Far East and in other dye markets prevents German domination and the arbitrary fixing of prices.

In 1921, Germany regained a large part of her trade in Far East markets, lost during the war. The occupation of the Ruhr in 1923 diminished the German export trade and stimulated that of the United States and other new dye-producing nations. In 1924, Germany returned with renewed energy to the Far East markets and began to regain her former supremacy in them.

Commercial warfare.—The well-known methods employed by the Germans prior to 1914 may be revived or extended at any time, the first being price cutting or destructive underselling. In the past, when a German firm encountered competition in a dye or other chemical product, it sold the goods at or below cost until the rival concerns were forced out of business. Such losses as may result from this price cutting designed to be, and usually are, made up by a higher selling price in countries where no competition is encountered or by a subsequent increase in price when competition has been eliminated. In this connection it should be borne in mind that the export-price levels of dyes in Germany since the war are far above those of pre-war years.

Full-line forcing has also been an effective weapon of commercial warfare. Germany produced certain products not duplicated elsewhere; the sale of these products can be and was made contingent upon the acceptance of a full line or by a refusal to sell any dyes whatever to consumers who attempted to divide their orders. Dumping,[1] and dishonest and deceptive labeling, are among measures which may be utilized.

[1] United States Tariff Commission report on Dyes and Related Coal-Tar Chemicals, 1918; see p. 26

EFFECT OF THE OCCUPATION OF THE RUHR.

In the month of January, 1923, just before the occupation of the Ruhr by the French, the production of dyes in German plants, based on the monthly reparation lists, totaled slightly over 20,000,000 pounds, or at the rate of 240,000,000 pounds per year—approximately 85 per cent of the pre-war production (1913). In the month of February, the total production receded to nearly 16,000,000 pounds and the output declined from that month until May, when it reached a minimum of 7,431,962 pounds, or 37 per cent of the January output. During the months of July, August, and September the output registered a slight increase; the average production being about 9,000,000 pounds per month. From October to December, however, the increase was more rapid, reaching an output of 15,390,586 pounds in December, or at the rate of nearly 185,000,000 pounds per year.

The effect of the occupation of the Ruhr was most pronounced in the Höchst and the Badische plants. These are two of the largest dye producers in the occupied zone. The equivalent quarterly output of the Höchst plant in January was 1,225,010 pounds, rapidly declining to 57,181 pounds in March, and during April and May production ceased. From June until November the average monthly production was about 15 per cent of the January figure. The November output showed a large increase, and the December production was over 70 per cent of the January figure. In the case of the Badische plant at Ludwigshafen, the January output was 5,304,426 pounds. After a slight drop in February an abrupt decline was registered, reaching in June the minimum of 131,385 pounds. Then, starting from an output of 419,641 pounds in July, the upward movement continued until it reached 5,506,835 pounds in December.

An examination of the monthly output figures of the other dye plants shows that the occupation had less effect on their output. The total monthly output of all plants in December had reached 76 per cent of the January figure, showing that the effect of the occupation had been overcome in the latter part of the year. The total output of 1923 was 75 per cent of the total 1922 production, and about 13 per cent of the production of the pre-war year 1913.

The production in January, 1924, was 14,153,841 pounds and that of February, 1924 increased to 15,750,430 pounds, equivalent to about 189,000,000 pounds per year.

STATISTICS OF EXPORTS AND IMPORTS.

The following tables show the development of Germany's trade in dyes since 1880:

TABLE 26.—*Development of the German export trade in coal-tar dyes, 1880–1913*

Year	Aniline and other coal-tar dyes				Alizarin and Alizarin dyes			
	Quantity		Value		Quantity		Value	
	Tons	Pounds	1,000 marks	Dollars	Tons	Pounds	1,000 marks	Dollars
1880	2,140	4,717,844	31,307	7,457,327	5,888	12,980,685	20,607	4,908,387
1885	4,646	10,242,572	34,846	8,300,317	4,284	9,444,506	9,510	2,265,282
1890	7,280	16,049,488	37,854	9,016,823	7,905	17,427,363	12,649	3,012,962
1895	15,789	34,808,429	63,156	15,043,759	8,928	19,682,669	11,606	2,764,349
1900	23,781	52,427,593	77,289	18,410,240	8,591	18,939,719	11,167	2,659,875
1905	36,570	80,622,222	100,654	23,975,783	9,339	20,588,759	15,532	3,699,722
1910	49,997	110,223,386	125,790	29,963,178	9,220	20,326,412	21,279	5,068,602
1911	52,480	115,697,408	119,507	28,466,567	9,624	21,217,070	19,647	4,679,913
1912	59,696	131,605,802	133,764	31,862,585	11,589	25,549,109	23,629	5,630,030
1913	64,288	141,729,325	142,079	33,843,218	11,040	24,337,902	21,573	5,138,686

Year	Indigo			
	Quantity		Value	
	Tons	Pounds	1,000 marks	Dollars
1880				
1885				
1890				
1895				
1900	1,873	4,129,216	9,364	2,229,832
1905	11,165	24,614,359	25,721	6,126,742
1910	17,564	38,721,594	39,613	9,433,094
1911	21,618	47,659,043	41,830	9,963,009
1912	24,827	54,733,604	45,216	10,770,457
1913	33,353	73,530,024	53,323	12,701,539

[1] Ullmann Enzyklopädie der technischen Chemie, vol. 5, p. 299.

TABLE 27.—*Germany: Imports of coal-tar dyes, by groups, 1923*

	Pounds	Value (1913 basis)		Pounds	Value (1913 basis)
Aniline and other not specially mentioned coal-tar dyes, sulphur colors:			Alizarin (red) and alizarine colors (variegated) from anthracene	8,598	1,196
Czechoslovakia	183,864		Indigo, natural and synthetic	18,078	13,990
Other countries	255,954		Indigo carmine, color lakes and blues of indigo and indigo carmine		
Total	439,818	$109,242			

BLE 28.—*Germany: Exports of coal-tar dyes, by countries, 1923*

Exported to—	Aniline and other not specially mentioned coal-tar dyes, sulphur colors	Alizarin; alizarine red	Alizarin dyes, variegated, from anthracene	Indigo, natural and artificial	Indigo, carmine color lakes, and new blue of indigo
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
	37,699				
	513,892				
	598,990				
	26,014				
	242,506				
	959,883		59,304		
	2,699,974		65,918		
	2,053,585		78,925	472,887	
	333,336				
	1,313,721			80,247	
	445,109				
	3,195,127		13,669	162,038	17,857
	533,954			43,872	
	2,491,198				
	253,529				
	539,466				
	827,607				
	2,619,065				
	156,527				
	187,611				
	532,190				
	169,754				
	506,582				
	1,586,430				
	2,457,027				
	1,014,336			16,755	
	253,749				
	123,237			69,445	28,659
	6,379,451	344,350	572,755	234,349	
	16,916,116			6,146,645	
	8,668,046		26,014	329,367	
	496,917	46,076	96,561	147,047	
	537,702				
	964,513				
	751,107				
	192,462				
	98,546				
	623,461				
	76,059				
	824,300		83,334		
	263,670	199,516	388,671	492,508	56,879
	63,700,815	589,951	1,385,151	8,195,160	103,395
	$34,223,210	$258,230	$813,008	$6,199,900	$86,394
	15,197,966	96,866	373,898	1,415,624	41,174

The British Dye Industry

Britain's pre-war position.—As stated in the Census of 1922, imption of dyes in Great Britain prior to the war has been l at about 20,000 tons. In 1913 the total imports of dyes were 41,203,008 pounds, with a value of $9,207,684. as reported by the First Census of Production of the United , the production was 139,000 hundredweight (15,568,000 valued at £373,000 ($1,855,204). It is estimated that the

British production of dyes before the war was somewhat over one-tenth of the consumption. In the manufacture of alizarin and sulphur black, British dye producers before the war held a notable position, as they entered into national conventions in regard to these products dominated by German influence. A limited variety of acid, direct, basic, sulphur, and some other of the simpler dyes were produced in that period. In 1913 the exports of dyes totaled 5,451,376 pounds, with a value of $862,566. The United States was the principal consumer, taking 33 per cent by weight and value, followed by Italy with 11.4 per cent by weight and 9.4 per cent by value, while Germany took 7.3 per cent by quantity and 11.5 per cent by value. Of the total British exports 27 per cent by weight and 23 per cent by value was shipped to British possessions. British India was the principal consumer among the dominions, taking in the fiscal year ended March, 1914, a total of 1,070,047 pounds, valued at $153,286, subdivided as follows: Alizarin dyes, 963,698 pounds, value $114,660; aniline dyes, 102,869 pounds, value $37,409; all other, 4,480 pounds, value $1,217.

Developments since the war.—Expansion in the dye industry of Great Britain from 1916 to 1920 resulted in the production of many colors in excess of the home requirements. In 1920, a year of world-wide business boom, before the reappearance of German dyes in the world markets, exports[1] reached a total of 13,791,680 pounds, with a value of $9,385,429. This is 153 per cent greater by quantity and nearly 100 per cent greater by value than the 1913 export figures. Since 1920 exports have shown an annual decline, the total for 1921 being 7,621,600 pounds, valued at $5,033,828, and for 1922, 3,860,416 pounds, valued at $2,300,298. In 1923, however, as the result of the Ruhr occupation, exports rose sharply to 14,132,944 pounds, valued at $4,719,924.

The year 1920 was probably the year of maximum production. The production of the British Dyestuffs Corporation was reported at about 16,000[2] tons. As this concern is stated to have produced about three-fourths of the total output, it would appear that the total production during that year was nearly 45,000,000 pounds. More recently, it has been reported that this concern produces about one-half of the total production. The total production of Great Britain[3] in 1922 is reported to have approximated 21,000,000 pounds, of which vat dyes exceeded 180,000 pounds and indigo 1,000,000 pounds. As the result of post-war developments in particular, the British dye industry (19 producers) is able to supply approximately eight-tenths of the home requirements, including an excellent variety of the vat dyes, with production fairly well balanced in the other classes.

Conditions in 1923.[4]—Although the continued trade depression in Great Britain has affected the demand for dyes, the year 1923 was a better year for the industry than 1922. In certain groups of dyes there was a decided improvement. The increased repair work by the railroads stimulated the consumption of paints and allied products and consequently increased the demand for color-lake dyes.

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[1] Report on Dyes and Dyestuffs, subcommittee appointed by the Standing Committee on Trade, printed and published by His Majesty's stationery office, London, 1921.
[2] U. S. Department of Commerce, *Trade Information Bulletin No. 231*.
[3] *The Dyestuffs Industry in 1923*, Sir William Alexander, The Chemical Age, Dec. 29, 1923.

igh price of cotton, however, has been an adverse factor in the vement of the cotton manufacturing industry, and normal tions in the dye industry can not be looked for until the cotton is itself in a more active state. The political situation in any and the occupation of the Ruhr by the French seriously ered with the export of British dyes. On the other hand, the tion in the available supply of German dyes for the world's ets was reflected in an increased demand for dyes of British facture. The official figures of exports of coal-tar dyes in Great in show that in 1923 they totaled 14,132,944 pounds, with a of $4,719,924, as against 1922 figures of 3,860,416 pounds, d at $2,300,298.

tish dye firms have devoted much attention to quality and ard of production. It has been stated that "the general level of y of British makers' production is equal to that of the best ental manufacturers."

e more important gaps in the range of British-made dyes are being ly reduced, about a score of dyes not previously manufactured eat Britain being placed on the market in 1923. Among Great in's contributions to the range of existing dyes are the Caledon greens of the Scottish Dyes, Limited, and the Cettutyl series of British Dyestuffs Corporation, used for Celanese silk. Owing to general business depression in Great Britain, with consequent mittent production, the maximum reduction in the costs of ucing coal-tar dyes is not yet attainable. The great importance duced production costs is fully realized by the dye makers. reported that the 1923 trading[5] profits of the British Dyestuffs oration amounted to £251,423, as compared with £102,657 922. The debit balance of £700,699 was reduced to £449,276.

glo-German negotiations.—Negotiations for a working ar- ement between the British Dyes Corporation and the I. G. carried on during 1922 and 1923. Up to July, 1924, no agree- had been concluded. Details of the proposals were not officially unced until April 8, 1924, when Sir William Alexander, Chair- and Managing Director of the British Dyes Corporation, speak- at the fifth annual meeting of the concern, summarized the tiations and the replies to some of the principal criticisms of roposed arrangement. The statement of Sir William Alexander part, as follows:

now pass to a subject which has caused discussion and criticism any quarters recently—namely, the negotiations which have proceeding for the conclusion of a working agreement between corporation and the Association of German Dyestuffs Manu- rers, generally known as the Interessen Gemeinschaft, or I. G. he ordinary general meeting held in 1922 I told you that in- al negotiations between ourselves and the I. G. had been pro- ng, and that whilst we would welcome an arrangement it must inviolate the principles upon which your undertaking was led; namely, the establishment of a dye-making industry in this try adequate to our needs both in peace and in war.

t that time the I. G. did not see their way clear to make or accept osals consistent with this principle, chiefly, in my opinion,

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nical Trade Journal and Chemical Engineer, Apr. 4, 1924, p. 419.

a fear that a contract might be concluded which would
access of dyestuff consumers in this country to German
pply with the advantages which that access confers in
echnical assistance in dyeing problems, information
developments, and in other ways. The proposals,
lrafted, provided that the I. G. should retire so far as
erned from the British market. To meet the views
roposed arrangement has been modified to permit their
man dyestuffs in any way they please, subject, of course,
tive restrictions.
d benefits.—We believe that, if we are able to bring our
o a satisfactory conclusion, they will result in an expan-
nge of dyestuffs to a point where the quality, quantity,
rice would guarantee the British consumer all the secur-
reasonably ask for. We are also of opinion that not
he arrangement secure a national industry for peace-
ients, but would provide the nation with an equipped
ersonnel as a most valuable contribution to our defenses
ril. Increased output by securing a greater share of
verseas requirements will mean more employment for
chemists and a reasonable return on their investments
olders who have invested capital, many from patriotic
his young industry."
terms of the proposed agreement are understood to be

tish Dyestuffs Corporation shall have a monopoly of
arket and a percentage share of foreign and colonial

e able to draw upon the I. G. for personnel and infor-
nanufacturing and technical processes on lines similar
ted between the I. G. and a corresponding French firm.
the I. G. shall receive one-half of the profits of the
ffs Corporation.
ish Dyestuffs Corporation shall offer users of dyes a
such dyes as it continues to import into this country
old at a higher price than is obtained abroad.
ll be no more reparation deliveries of dyestuffs.
imports and exports.—The following tables show the
nited Kingdom in coal-tar dyes, 1922 and 1923:

.—*The United Kingdom: Imports of coal-tar dyes, 1922*

	1922		Imported from—	1922	
	Pounds	Value		Pounds	Value
			Other coal-tar dyes—Con.		
	1,274,224	$265,994	Netherlands	1,680	$1,634
	1,120	2,205	Belgium	27,325	49,880
		208	Switzerland	1,894,369	3,546,746
			United States	16,800	6,187
	1,275,344	268,407	Other foreign countries	7,729	10,150
	572,768	13,321	British possessions	25,648	18,365
	2,628,529	1,958,269	Total	4,602,080	5,591,431

artment of Commerce, Chemical Division, *Trade Information Bulletin No. 231.*

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TABLE 30.—*The United Kingdom: Exports of coal-tar dyes, 1922*

Exported to—	1922		Exported to—	1923	
	Pounds	Value		Pounds	Va
Alizarin:			Other sorts—Continued.		
Java	33,936	$10,536	Spain	77,036	
France	47,264	27,068	Italy	22,064	
United States	33,824	19,672	China [1]	70,000	
Brazil	448	877	Japan [1]	5,696	
Other foreign countries	6,160	939	United States	280,656	
Total to foreign countries	121,632	59,092	Brazil	83,552	
			Other foreign countries	50,400	
British India	698,208	184,272	Total foreign countries	1,414,112	
Other British possessions	9,520	7,352			
Total British possessions	707,728	191,624	Egypt	8,512	
Total	829,360	250,716	Union of South Africa	127,456	
			British India—		
Indigo, synthetic:			Bombay (including Karachi)	261,408	
Spain	560	$159	Madras	46,144	
China [1]	9,408	5,169	Bengal, Assam, Bihar, and Orissa	28,672	
Other foreign countries	1,680	850	Burmah	3,696	
Total foreign countries	11,648	6,178	Hongkong	9,072	
			Australia—		
Australia	52,416	22,502	Western Australia	2,912	
Other British possessions	448	266	South Australia (including northern territory)	17,136	
Total British possessions	52,864	22,768	Victoria	280,424	
			New South Wales	204,512	
Total	64,512	28,946	Queensland	27,552	
			Tasmania	224	
Other sorts:			New Zealand	125,664	
Russia	560	979	Canada	255,920	
Sweden	50,624	40,602	Other British possessions	44,128	
Norway	49,168	44,038			
Denmark	32,368	15,336	Total British possessions	1,532,432	
Germany	13,328	10,956			
Netherlands	208,208	133,378	Total	2,966,544	
Belgium	137,648	89,999			
France	106,624	67,896			
Switzerland	310,128	125,672			
Portugal	18,032	9,832			

[1] Exclusive of Hongkong, Macao, and leased territories.
[2] Including Formosa and Japanese leased territories in China.

TABLE 31.—*The United Kingdom: Imports and exports of coal-tar dyes, 1922*

	1922		1923	
	Pounds	Value	Pounds	V
Imports:				
Alizarin	1,275,344	$268,407	941,808	
Indigo, synthetic	572,768	15,321	926,688	
Others	4,602,080	5,591,432	4,421,088	
Exports	3,800,416	2,300,298	14,132,944	

Exchange values: £, year, 1922—$4.42865; £, year, 1923—$4.5740.

THE SWISS DYE INDUSTRY

Prior to the war the Swiss dye industry, notwithstanding absence of raw materials, ranked second to that of Germany, pro ing about 7 per cent of the total world's output, the value of dy ports in 1913 from Switzerland exceeding one-tenth of the value of the products exported from Germany. The raw mate were formerly imported almost entirely from Germany. During since the war these materials have been imported from Great Br the United States, France, Italy, Poland, and more recently Germany.

e absence of German dyes from the world's markets during mmediately after the war resulted in a period of unprecedented erity for Swiss dye manufacturers. In 1920 the exports of dyes totaled 23,739,793 pounds, with a value of $35,411,115—six times that of the pre-war year 1913.

e three leading dye producers of Switzerland located in Basel, ly, Die Gesellschaft für Chemische Industrie (known as "Ciba"), Chemische Fabrik, vormals Sandoz, and the J. R. Geigy Co., ed a union of interests ("Interessen Gemeinschaft") similar to of the German dye producers. A significant development among wiss dye manufacturers is the establishment and operation of branch plants in foreign countries. In the United States, branch plants are the Cincinnati Chemical Works, at Norwood St. Bernard, Ohio; in Great Britain, the Clayton Aniline Co.), at Clayton, near Manchester; in Italy, the Fabbrica Lom-a Colori D'Anilina and the Felli Co. (successors of Fisher and old) are understood to be connected with the Swiss manufac-s; in France, the Swiss manufacturers are similarly reported ve branch plants. Prior to the war, the Society of the Chemi-ndustry of Basel had a branch plant at St. Fous, and the J. R. y Co., of Basel, operated a branch at Maronne, near Rouen. ough the new dye-producing nations—Great Britain, the United s, France, and Italy—have adopted tariff and other protective ures which have resulted in a diminution of dye exports from zerland, the Swiss industry has been able, through the branch s operated in those countries, to cater to their dye require-s to an extent beyond that indicated merely by the imports nating directly in Switzerland.

tistics of imports and exports.—The following tables show the t of Switzerland's trade in coal-tar dyes in 1923:

TABLE 32.—*Switzerland: Imports and exports of coal-tar dyes, 1923*

	Aniline and other coal-tar dyes		Indigo, indigo solution		Alizarin, synthetic	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS						
ny	1,456,579	$792,834	22,046	$9,030	243,167	$40,093
	882	903	441	181		
	17,416	18,241	201,280	84,882	3,307	2,528
	23,148	18,782				
Britain	9,700	4,696				
ountries	2,205	2,348				
otal	1,509,930	837,804	223,767	94,093	246,474	42,621
EXPORTS						
ny	49,824	38,829				
	116,182	105,832	121,253	34,856		
	1,925,498	1,936,574	6,393	6,502		
	537,481	568,168	128,528	38,107		
n	953,269	521,392	73,854	22,214		
d	258,820	234,780	90,830	23,117		
Britain	1,308,871	1,713,352				
	104,498	167,416	13,669	16,796		
al	108,246	85,604				
rk	176,368	175,543	7,937	10,114		
y	36,155	39,371				
	517,640	469,741				
d	94,798	77,658				
	114,198	131,116				
lovakia	681,883	515,794				
y	15,873	23,839				
	15,432	13,364				

TABLE 32.—*Switzerland: Imports and exports of coal-tar dyes, 1923*—Contd.

	Aniline and other coal-tar dyes		Indigo, indigo solution		Alizarin, synthetic	
	Pounds	Value	Pounds	Value	Pounds	Value
EXPORTS—continued						
Bulgaria	29,983	$19,866				
Rumania	22,707	19,686	22,487	$5,599		
Russia	11,464	27,090				
Egypt	20,282	18,421	268,079	95,718		
Mesopotamia	2,646	3,973	8,157	6,682		
British India	219,578	155,677	33,510	14,448		
Dutch India	65,036	63,932	214,948	57,250		
China	100,971	82,895	7,085,364	1,806,903		
Japan	654,546	633,591	573,857	558,596		
Canada	189,816	161,456				
United States	837,968	1,063,734				
Mexico	93,696	93,190				
Brazil	150,133	210,941				
Uruguay	7,937	6,682				
Argentina	103,175	87,952				
Chile	18,739	19,144				
Algeria			4,409	3,070		
Other	23,148	26,006	62,831	21,130		
Total	9,566,861	9,532,609	8,716,106	2,721,102		

Converted from francs to dollars on the basis of 1 franc=$0.1806—the annual average for 1923.

THE FRENCH DYE INDUSTRY

In the commission's report in 1922[7] the French dye industry for the following periods was considered:

Dye production in France, immediately prior to the war.

Developments during and after the war, together with the production figures for the years 1919, 1920, 1921, and part of 1922.

Merger of Kuhlmann and Compagnie Nationale.—The merger of "Etablissements Kuhlmann" and the "Compagnie Nationale de Matières Colorantes et de Produits Chimiques" on December 27, 1923, is probably the most significant event of that year in the French chemical industry, involving as it did a consolidation of organic and inorganic chemical undertakings. The new firm is known as "Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Rèunies."

The merger is expected to result in administrative and sales economy, reduction of overhead, the avoidance of duplication in manufacture, and the union of technical staffs. The new firm will produce a diversity of organic and inorganic products, affording added stability and security in times of crisis.

The financial advantages are conspicuous, as the Compagnie Nationale, while possessing an excellent technical staff, had not established itself on a solid financial basis. The Kuhlmann is in a strong financial position and has a century-long tradition of good administration. The nominal capital of the Etablissements Kuhlmann will be increased to 150,000,000 francs by an issue of 50,000,000 francs of new shares having a par value of 250 francs each. The shares of the Compagnie Nationale de Matières Colorantes will be exchanged share for share for the new Kuhlmann stock, dated as of

[7] U. S. Tariff Commission, *Census of Dyes and Other Synthetic Organic Chemicals*, p. 134.

January 1, 1924, and will receive an exchange settlement of 25 francs per share. This settlement will largely cover the tax applying to the operation of fusing the two companies.

The new concern produces a variety of products, including mineral acids, phosphate, nitrogen fertilizer, raw materials for the glass industry, ice plants, and the tanning industry; fungicides, dyes, pharmaceutical and other organic chemicals.

The Etablissements Kuhlmann manufactures mineral acids and has already produced certain intermediates at La Madeleine-lez-Lille plant. Intermediates will continue to be made at Oissel, with the exception of a few products consuming a large amount of acid to be drawn from La Madeleine plant. Dye manufacture will remain centralized in large works developed by the Compagnie Nationale at Villers-Saint-Paul.

The Compagnie Nationale de Matières Colorantes et de Produits Chimiques was formed in 1916 with the support of the Government and the cooperation of many French industrial and financial interests. It had originally a capital of 40,000,000 francs, increased in 1919 to 71,000,000 on its fusion with the Societé de Produits Chimiques et Colorantes Francais. In 1921 the capital was increased to 100,000,000 francs. The rapid development of this concern enabled it to supply a large part of French dye requirements, attention being first given to the bulk colors and later to some of the specialties.

Statistics of production, imports, and exports.—The following table, taken from an advertisement of the Compagnie Nationale of France, shows for the years 1918–1922 its production of 20-per cent indigo paste and of other coal-tar colors.

	1918	1919	1920	1921	1922
Indigo paste, 20-per cent, pounds	33,415	1,119,381	6,537,521	5,812,428	3,039,041
Other dyes, pounds	16,627	695,364	3,440,931	2,667,204	5,986,624

TABLE 33.—*France: Dye production*[1] *(pounds), 1920–1923*

Year	Azo dyes	Indigo and sulphonated derivatives	Sulphur dyes	Diphenyl and triphenyl methane	Alizarin and other oxyketone	Indophenols, oxazines, and thiazines	Unspecified	Total
1920	4,975,782	6,571,913	3,452,404	141,094	19,841	19,841	374,782	15,555,657
1921	4,204,172	5,839,985	1,814,386	403,442	211,642	136,685	328,485	12,938,797
1922	7,881,445	3,075,417	3,769,866	1,234,576	731,927	191,800	897,272	17,782,303
1923	11,296,370	4,700,207	5,024,283	1,483,696	570,991	145,504	959,001	24,180,052

[1] L'Industrie Chimique, April, 1924. Does not include data for Swiss plant at St. Fous.

TABLE 34.—*France: Imports and exports of coal-tar dyes, 1922 and 1923*

IMPORTS

Class	1922				1923			
	Dry		Paste		Dry		Paste	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Nitroso	4,189	$2,458	441	$328	4,630	$4,188		
Nitro	2,646	2,704			1,984	1,093		
Pyrazolone	121,694	165,744	220	82	133,819	118,729		
Stilbene	58,201	50,223			41,887	34,256		
Monoazo	784,838	568,676	27,998	9,258	447,313	287,293	12,125	[illegible]
Polyazo	1,165,352	916,961	20,062	4,015	517,199	438,558	2,425	[illegible]
Thiobenzenyl	34,612	40,064			22,707	31,868	441	[illegible]
Sulphur	172,841	133,382			118,607	84,677	8,039	[illegible]
Indophenol	550,930	241,530	91,270	35,803	304,896	390,908	104,719	[illegible]
Azines	86,200	92,253	14,991	3,277	76,720	46,375	5,291	[illegible]
Pyronines	35,935	82,585		82	24,030	55,176	661	[illegible]
Eosines	12,566	27,856	441	246	24,912	49,895	441	[illegible]
Diphenylmethane	406,087	603,169	220	574	425,047	456,343	441	[illegible]
Acridines	44,753	86,764			54,013	85,587		
Hydroquinones	57,320	83,241	68,343	27,938	130,512	188,109	75,828	[illegible]
Indigotines	19,841	22,695	7,275	5,080	6,834	6,616	1,323	[illegible]
Insoluble vat colors other than indigo	38,581	34,820	98,766	40,228	168,652	279,402	236,554	[illegible]
Cibanones	12,566	12,044	25,573	28,594	28,219	38,787	41,226	[illegible]
Total	3,609,152	3,167,169	355,600	155,505	2,531,981	2,597,900	496,324	[illegible]

EXPORTS

Class	1922				1923			
	Dry		Paste		Dry		Paste	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Nitroso	39,903	$19,581	9,480	$1,639	120,151	$47,164	2,425	[illegible]
Nitro	441	328	441	164	18,078	8,984		
Pyrazolone	882	655	2,866	819	661	304		
Stilbene	220	164			19,400	8,377	220	[illegible]
Monoazo	4,850	1,884	1,323	328	34,392	10,805	882	[illegible]
Polyazo	1,102	492	220	82	326,060	128,016		
Thiobenzenyl					1,984	1,578		
Sulphur	12,787	3,359	1,323	246	8,157	1,700		
Indophenol	7,496	8,111			9,480	8,255	1,323	[illegible]
Azines	2,646	2,294	441	246	8,818	6,313		
Pyronines	48,060	122,567			658,294	1,346,690		
Eosines	882	1,475			18,960	29,075	1,984	[illegible]
Diphenylmethane	655,648	628,731	69,665	31,133	1,990,313	1,526,720	27,337	[illegible]
Acridines							220	
Hydroquinones	3,086	4,916	5,952	1,966	4,409	5,645	798,065	[illegible]
Indigotines	188,714	150,751	143,299	76,686	185,848	118,790	268,079	[illegible]
Insoluble vat colors other than indigo	18,078	26,381	31,746	9,422	141,756	164,801	2,425	[illegible]
Cibanones							661	[illegible]
Total	984,795	971,689	266,756	122,731	3,546,761	3,413,223	1,103,621	[illegible]

Exchange rate, 1922, 1,000 francs=$81.93.
Exchange rate, 1923, 1,000 francs=$60.70.

THE ITALIAN DYE INDUSTRY

Pre-war production.—Prior to the war the production of dyes in Italy was practically negligible, the country's requirements being mostly imported from Germany. On account of the lack of coal, Italy, like Switzerland, is very largely dependent upon imported raw materials although having a limited output of crudes, together with sulphur and salt and the advantage of electrolytic development for

the manufacture of chlorine and caustic soda. The sulphur dye named Italian Green was manufactured by Lepetit & Dollgus before the war, and some dyes, including sulphur black, were made from imported intermediates. The sulphur black was made in small quantities in 1908 by Rinalso Ghisotti, at Turro; this plant was later acquired by A. Bonneti, who produced aniline. The company which is now known as Societá Chimica Lombarda, A. E. Bianchi Company of Rho (Milan), began to manufacture sulphur black in 1913.

Post-war developments.—The Bianchi firm, on the outbreak of the war, began the manufacture of explosives and particularly of dinitrophenol; they increased their output of sulphur black and started the production of certain azo dyes. In 1923 the output of dyes by this firm was about 5 tons per day and they are to-day one of the larger producers. The concern has an agreement with the Cassella Works, of Frankfort, and imports some of its intermediates from Germany. In 1914, Dellapiane & Co. began the production of sulphur black and in 1915 produced other sulphur dyes. The plant was moved to Rho in 1916, and in 1918 was reorganized under the name Societa Italica Colori Artificiali (Italica). It now produces many azo dyes, including direct dyes for cotton and a number of basic dyes, together with a wide range of sulphur colors. All these dyes are said to be produced from intermediates manufactured at the plant. In 1916 this firm had only four chemists, but in 1923 had 28, and its daily output of dyes in the latter year was about 5,000 kilos (11,000 pounds).

The Botelli Company, of Madonna di Campagna (Turin), began the production of sulphur black during the war. In 1919 the firm amalgamated with the Fabrique de Produits Chimiques, the Rohner Company, of Isvizzera, and the new concern is now producing intermediates for azo dyes, chrome colors, etc. The Schiapparelli concern, of Turin, produces aniline oil and sulphur black, and the Ledogia firm at Garessio manufactures sulphur colors.

The plant of the Societá Italiana Prodotti Esplodente (known as "S. I. P. E."), more particularly designed for the manufacture of explosives, was later diverted to the manufacture of synthetic dyes. The company produces at its Cengio (Liguria) works large quantities of aniline oil and other intermediates and is reported to be connected with the Societá Italica Colori Artificiali.

During the war, the Industria Nazionali Colori de Anilina (known as "I. N. C. A.") produced dinitrophenol, and in 1916 acquired licenses for operating a number of patents owned by Levinstein's Limited, of Great Britain; in 1919 it began the production of sulphur dyes, direct cotton dyes, and acid dyes. In 1923 it produced 1,600 tons of sulphur black and 200 tons of other colors.

The Fabbriche Italiane Materie Coloranti Bonelli, organized during the war for the manufacture of munitions, especially dinitrophenol, erected in the immediate post-war period a large electrolytic alkali plant and began the production of dyes. At present it is one of the largest dye producers in Italy. Among other firms may be mentioned the Fabbrica Lombarda Colori Anilina ("I. P. C. A."), which, following a commercial agreement with the Swiss manufacturers, Sandoz & Co., began the production of sulphur black and a few direct cotton colors at its Bovisa (Milan) works.

[illegible] Aniline [illegible]

[illegible] Hiemish [illegible]

[illegible] the war [illegible]

[illegible] the total Italian [illegible] pounds [illegible]

[illegible] of about [illegible]

[illegible] of June [illegible] kilograms [illegible]

[illegible] The production of [illegible] pounds [illegible] Among the [illegible] blue, V[illegible]

[illegible] the construction [illegible] No attemp[illegible] was done in Italy.

[illegible] Production of [illegible] 1919–1922

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Pounds	Pounds	Pounds	Pounds
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] 1922, and first [illegible] 1923

	1922		First [illegible] months	
	Pounds	Value	Pounds	V[illegible]
[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]			
[illegible] per cent of water	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible] per cent or more of water	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible] per cent of water	[illegible]	[illegible]	[illegible]	
[illegible] per cent or more of water	1[illegible] 272	[illegible]	[illegible]	

[illegible] pounds.
[illegible] 1922 [illegible]
[illegible] September, inclusive, 1923 — [illegible]

[illegible] Italian [illegible] Industry," Chemical Trade Journal, May 2, 1924, p. 5[illegible].
[illegible] delle materie coloranti in Italia ed i nuovi processi per la fabbricazione di taluni d[illegible] [illegible] al Congresso Nazionale di Chimica; Rome, June, 1923.

The Japanese Dye Industry

elopments.—Previous to the outbreak of the World War, s largely dependent upon imports of synthetic coal-tar m Germany. The exports of coal-tar dyes from Germany in 1913 were 9,744,333 pounds, valued at $3,453,900. In he importance of her textile industries, Japan was seriously by the shortage of dyes when German imports were cut off eginning of the war. Although Japan has in its coal-gas a domestic source of crude coal-tar materials, it is reported Japanese production of coal tar is insufficient to supply or all the dyestuffs required. The nine gas and other es producing coal-tar products in 1918 are credited with an or that year of 5,415 tons of crudes, including 3,100 tons of ; 590 tons of toluene; 40 tons of xylene; 125 tons of phenol; ns of refined naphthalene, and 160 tons of crude anthracene. he encouragement of the Government, the dye industry devel- that more than 100 factories were engaged in that industry the war. There were large post-war imports of foreign dyes e manufacturers who have remained in business have had ive considerable aid from the Japanese Government.

luction.—Figures for 1918–1923 are given in the following table:

TABLE 37.—*Japan: Production of coal-tar dyes, 1918–1923*

[Chemical Trade Bulletin No. 24-B," and "Trade Information Bulletin No. 217," U. S. Department of Commerce]

Class	1918	1919	1920	1921	1923
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
	923, 848	557, 575	276, 861	396, 660	628, 026
	141, 685	205, 474	144, 632	119, 113	242, 204
	409, 994	324, 231	364, 360	463, 227	264, 377
t	153, 478		86, 003	170, 034	13, 546
ordant	53, 182		13, 508	9, 205	4, 802
	106		265	96, 442	3, 144
r	7, 353, 034	14, 130, 935	6, 659, 532	10, 585, 063	11, 296, 931
aneous	2, 746, 897	1, 250, 063	471, 718	766, 708	1, 004, 705
Total	11, 782, 224	16, 468, 278	8, 016, 879	12, 606, 452	13, 457, 735

he tendency in Japan to-day is to import the more expensive s and to manufacture the cheaper colors. As may be seen from above table, sulphur colors form the bulk of the requirements he domestic market. Sulphur black in large quantities, as well maller amounts of the other sulphur colors, are used for dyeing on fabrics to be made into garments. In addition to the manu- ure of sulphur colors the Japanese manufacturers have success- y produced direct colors, among which may be mentioned Benzo red A; Congo red; Benzo purpurine; Chrysophenine yellow; ct black and Direct blue; basic dyes, such as Methylene blue; hyl violet, and Rhodamine B; also some acid dyes and alizarines. s reported that only two dye factories are now operating on a e scale in Japan—the Japan Dye Manufacturing Co., Osaka, the Mitsui Mining Co.

mports, 1920–1923.—Since 1918 there has been a steady increase he quantity of foreign dyes imported. The present duty (May, 4) on natural indigo dry is $12.69 per 100 pounds; on natural

indigo paste 20 per cent ad valorem. The duty on artificial indigo is 20 per cent ad valorem, and on other coal-tar dyes 35 per cent ad valorem. Germany has made a strong effort to capture this market and in 1921 was the leading exporter; on the other hand, imports of dyes from the United States have more or less steadily declined until, in 1923, they amounted to less than 4 per cent of the total.

TABLE 38.—*Japan: Imports of coal-tar dyes, by classes, 1920, 1921, 1922, and first six months of 1923*

Class	1920		1921		1922		1923 (6 months)	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Indigo, dry natural	1,915,515	$3,940,086	1,186,765	$1,611,763	375,115	$992,258	49,851	$98,18
Indigo, artificial	490,864	1,237,374	2,174,319	3,374,973	3,175,726	2,498,463	1,537,131	992,18
Aniline dyes	4,330,299	7,457,796	5,461,901	6,262,283	5,999,886	6,198,386	5,745,584	2,887,68
Other coal-tar dyes	114,074	273,911	116,576	221,551	351,205	326,374	51,720	6,18

TABLE 39.—*Japan: Imports of coal-tar dyes, 1922 and first six months of 1923*

Imports from—	1922		1923 (6 months)	
	Pounds	Value	Pounds	Value
Great Britain	39,551	$26,201	32,032	$21,68
France	73,401	59,413	74,098	31,33
Germany	8,264,733	5,946,265	4,983,203	2,418,27
Switzerland	154,518	126,839	336,726	237,18
United States	796,093	353,203	338,428	167,13
Other countries	22,795	14,837	32,798	21,93
Total	9,351,091	6,526,760	5,797,284	2,898,42

One kin.=1.32277 pounds avoidupois.
Exchange rate for yen, 1920=$0.50066.
Exchange rate for yen, 1921=$0.48154.
Exchange rate for yen, 1922=$0.47908.
Exchange rate for yen, 1923=$0.48745 first six months.

THE DYE TRADE OF OTHER COUNTRIES

TABLE 40.—*Argentina: Imports of coal-tar dyes, 1921 and 1922*

	1921		1922	
	Pounds	Value	Pounds	Value
Aniline dyes	919,556	$322,435	1,043,799	$401,54
Indigo	985	402	741	68

One gold peso, average, 1921=$0.7290.
One gold peso, average, 1922=$0.81814.

.—*Austria: Imports and exports of coal-tar dyes, 1921, 1922, and first six months of 1923*

	Imports		Exports	
	1921	1922	1921	1922
	Pounds	*Pounds*	*Pounds*	*Pounds*
	3,405,886		6,834	
	18,298		220	
kia	6,388		46,297	
	1,323		120,502	
in	441			
			220	
	220		3,527	
			20,723	
			88,404	
			75,177	
ries	5,071		8,818	
	3,437,632	2,760,380	370,812	179,895

1923 (6 months)

Country	Alizarin colors		Synthetic indigo		Other coal-tar colors	
	Imports	Exports	Imports	Exports	Imports	Exports
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
	41,887		22,046	5,512	382,939	3,086
		661				
		441				20,062
	4,189		15,653		33,510	
		1,323		661	220	14,109
kia			10,803		7,055	2,866
						3,307
						20,282
tries		661			3,968	3,086
	46,076	3,086	48,501	6,173	427,692	66,799
	$18,639	$1,418	$10,535	$1,621	$176,870	$23,907

2.—*Belgium: Imports and exports of indigo, natural and artificial, 1922 and 1923*

	1922		1923	
	Pounds	Value	Pounds	Value
om—				
ritain	5,922	$3,239	8,285	$1,699
India	3,053	5,689		
ands				
			185,012	33,403
ountries	2,317	699		
	11,292	9,627	193,297	35,102
—				
ritain	31,753	25,331		
ountries	3,655	641	33,737	7,531
	35,408	25,972	33,737	7,531

, average of year, 1922—$0.07676.
, average of year, 1923—$0.0519.

TABLE 43.—*Brazil: Imports of coal-tar dyes, 1922*

	1922	
	Pounds	Value
Aniline or fuchsine dyes	1,541,982	$702,43
Indigo and ultramarine blue	1,142,025	244,14

One milreis, paper, average of year, 1922=$0.12935.

TABLE 44.—*Canada: Imports of coal-tar dyes, fiscal year ended March 31, 1923 and 9 months ended December 31, 1923*

	Fiscal year ended March 31, 1923		Nine months ended December 31, 1923	
	Pounds	Value	Pounds	Value
Aniline and coal-tar dyes soluble in water, including alizarin and artificial alizarin:				
United Kingdom	326,393	$166,179	207,366	$100,841
United States	1,974,555	1,214,598	1,347,474	796,492
Germany	254,533	358,288	509,964	354,247
Netherlands	338,251	238,508	193,158	153,046
Switzerland	202,786	183,026	142,930	113,195
Sweden			142,270	67,059
Other countries	88,043	76,667	4,947	2,139
Total	3,184,561	2,237,265	2,548,109	1,586,975
Indigo:				
United States	639	933	322	471
Other countries				
Total	639	933	322	471
Indigo, paste and extract:				
United Kingdom				
United States	54,691	11,998	85,371	18,447
Germany	11,431	28,576		
Other countries	39,027	8,387	43,935	7,516
Total	105,149	48,961	129,306	25,963

Canadian dollar, average for year ended March 31, 1923=$0.99137.
Canadian dollar, average April-December, inclusive, 1923=$0.97791.

TABLE 45.—*China: Imports of "dyes, colors, and paints" (aniline), 1921*

Imported from—	Value	Imported from—	Value
Hong Kong	$1,062,621	Switzerland	$100,479
Macao	21,777	Austria and Hungary	
French Indo-China	1,132	Russia, Pacific Ports	
Siam	225	Korea	48
Singapore, Straits, etc	129	Japan (including Formosa)	541,970
British India	4,847	Philippine Islands	20
Great Britain	190,534	Canada	88
Sweden	62,668	United States (including Hawaii)	720,029
Germany	2,576,611	Direct gross import	$6,476,847
Netherlands	791,310	Reexported abroad	412,757
Belgium	570,097		
France	7,362	Total net import	6,063,090
Italy	28,907		

Haikwan tael, 1921=$0.76.
The 1921 Chinese imports of synthetic indigo and unclassified dyes were published in the "Census of Dyes and other Synthetic Organic Chemicals, 1922," pp. 148, 149.

TABLE 46.—*China: Imports of dyes, colors, and paints, 1922*

(Foreign Trade of China, 1922)

Imported from—	Aniline	Indigo, artificial		Dyes and colors, unclassed [1]	
	Value	Pounds	Value	Pounds	Value
Hongkong	$1,058,423	1,790,800	$709,634	12,186,264	$888,195
Macao				94,000	2,653
French Indo-China	6,242	22,533	15,764	198,533	3,682
Siam	235			400	105
Singapore, Straits, etc	138			683,867	26,631
Dutch Indies	10,397	1,333	664	123,200	7,622
British India	12,087			103,867	14,321
Great Britain	93,854	235,333	162,658	183,733	44,376
Norway	1,992			10,533	7,282
Sweden	13,140				
Denmark	10,269			1,067	104
Germany	2,574,609	13,374,263	4,397,183	1,282,800	241,229
Netherlands	1,431,709	8,030,665	2,768,004	610,667	90,550
Belgium	322,164	1,130,400	418,003	277,733	38,258
France	5,726	932,133	360,633	173,200	23,378
Switzerland	33,848	5,234,265	1,604,105		92
Italy	447	479,867	133,739	45,600	4,362
Austria and Hungary					
Russia and Siberia by land frontier	1,610	1,733	962	70,267	5,603
Russia and Amur ports				61,867	7,320
Russia and Pacific ports	310			643,866	41,311
Korea	6,661	267	108	1,942,133	30,090
Japan (including Formosa)	308,600	13,200	5,234	7,385,198	779,238
Canada	274	33,333	11,970	8,933	5,094
United States (including Hawaii)	150,607	2,137,200	795,500	43,467	27,915
Turkey, Persia, Egypt, etc					7
Total	6,043,242	33,417,325	11,384,151	26,131,194	1,919,505
Reexport	358,649	3,117,733	1,174,150	130,400	25,475
Net total	5,684,593	30,299,592	10,210,001	26,000,793	1,894,030

Equivalent of the "haikwan tael," 1922,=$0.83.
Converted from "piculs" to pounds=133.3333 pounds to picul.

[1] Probably includes colors other than coal-tar dyes.

TABLE 47.—*Czechoslovakia: Imports of coal-tar dyes, 1920, 1921, and 1922*

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
Indigo, natural:						
France			24,057	$60,996	1,545	$2,013
Austria			2,817	7,144	44	45
Germany			351	889	14,112	18,636
Total	7,906	$6,653	27,225	69,029	15,701	20,694
Alizarin, alizarin colors, indigo, synthetic:						
Germany			1,649,041	1,412,570	401,678	82,340
Switzerland			4,189	3,588	661	145
Austria			441	378		
Total	425,267	148,533	1,653,670	1,416,536	402,339	82,485
Azo and sulphur dyes:						
Germany			1,509,269	951,531	299,826	150,259
Switzerland			22,707	14,316	38,581	18,345
Total	1,558,873	1,088,934	1,531,976	965,847	338,407	168,604
Coal-tar dyes, other:						
Germany			7,353,443	4,333,689	6,684,127	5,198,925
Switzerland			250,443	147,596	364,641	285,798
Austria			39,903	23,517	20,503	16,836
France			23,589	13,902	8,157	5,959
Hungary			882	520	441	289
China			220	130		
Italy					5,291	4,426
Poland					1,323	1,128
Saar Basin					1,102	723
Total	4,223,352	3,097,686	7,668,481	4,519,354	7,085,584	5,514,084

TABLE 48.—*Czechoslovakia: Exports of coal-tar dyes, 1920, 1921, and 1922*

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
Indigo, natural:						
Jugoslavia			35	$89	11	$15
Ethiopia			2	6		
Great Britain						
Total			37	95	11	15
Alizarin, alizarin colors and indigo, synthetic:						
British possessions in Asia			359,791	320,525	112,876	28,696
Hamburg			139,772	124,518		
Switzerland			93,475	83,274	31,746	6,965
Netherlands			12,566	11,195	79,145	17,399
Germany			8,157	7,267	661	145
Belgium			5,732	5,106		
Poland			3,527	3,142	4,830	1,061
Austria			1,323	1,178	3,086	678
Italy			1,102	982		
Denmark					1,102	241
Japan					5,071	1,109
Total	697,756	$194,964	625,445	557,187	238,537	52,399
Azo and sulphur dyes:						
Germany			4,850	3,158	14,550	7,277
Poland			16,094	10,477	5,512	2,756
Austria					4,409	1,938
Rumania			4,189	2,727		
Jugoslavia					2,425	955
Italy					220	84
Other countries			9,700	6,315		
Total	11,905	9,148	34,833	22,677	27,116	12,968
Coal-tar dyes, other:						
Germany			54,454	31,719	59,304	47,472
Poland			33,069	19,262	23,589	18,447
Jugoslavia			21,385	12,456	67,020	51,068
Rumania			19,180	11,172	8,157	6,625
Italy			11,905	6,934	14,109	11,147
Hungary			4,850	2,825	4,189	3,404
Austria			3,036	1,798	14,330	9,517
Spain					3,086	2,141
Belgium					3,527	2,739
Possessions of France in Africa					1,543	1,051
France					3,086	2,411
Other countries			7,937	4,623	2,205	1,628
Total	227,294	166,713	155,866	90,789	204,145	157,965

One crown, average 1920—$0.0854.
One crown, average 1921—$0.0151077.
One crown, average 1922—$0.024107.
One quintal—220.46 pounds

TABLE 49.—*Czechoslovakia: Imports and exports of coal-tar dyes, 1923*

	1923	
	Pounds	Value
IMPORTS		
Germany	4,348,847	$3,253,434
Hungary	2,953	1,695
Switzerland	573,024	362,722
Other countries	193,487	71,385
Total	5,118,341	2,689,185
EXPORTS—OUT OF FREE TRAFFIC		
Netherlands	134,511	27,195
Germany	226,095	55,126
Poland	23,946	7,055
Jugoslavia	8,139	3,382
Switzerland	55,552	25,728
East Indies	167,371	30,377
Other countries	190,233	85,989
Total	755,847	235,051

Exchange rate for Czecho crowns, 1923—.029465 average.

TABLE 50.—*Dutch East Indies: Imports of coal-tar dyes, 1922 and 1923*

	1922				1923
	Wet		Dry		Wet and dry
	Pounds	Value	Pounds	Value	Pounds
Alizarin dyes:					
Netherlands	250,398	$134,613	21,054	$21,211	206,836
Great Britain	56,416	24,526	110	88	246,430
Germany	180,006	85,584	33,962	36,055	250,471
Belgium					7,936
Japan					45,770
Total	486,820	244,723	55,126	57,354	757,443
Anfline dyes:					
Netherlands	4,674		125,742		98,579
Great Britain					2,130
Germany	2,888		196,176		373,153
Belgium			14,037		11,072
Italy					6,107
Switzerland			7,793		49,626
Singapore			4,852		260
Hongkong					244
Other countries	110		10,723		440
Total	7,672		359,323		541,611
Synthetic indigo:					
Netherlands	591,505	357,507	5,558		214,012
Great Britain					30,093
Germany	499,322	282,527	1,462		194,911
France					142,285
Belgium	6,614	2,887			
Italy	51,632	19,012	4,189		71,947
Switzerland	19,841	7,044			153,793
Hongkong					43,651
China					86,112
Japan					2,248
Other countries			2,039		132
Total	1,168,914	668,977	13,248		939,184

One gulden, average 1922=$0.3849.

TABLE 51.—*Dutch East Indies: Exports of natural indigo, 1920–1923*

Java and Madura	1920	1921	1922	1923
Indigo, dry:	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Netherlands	586	2,363	7,394	
Singapore	58,510	97,399	11,023	
China				441
Japan	9,963	54,068	10,582	8,457
Total	69,059	153,830	28,999	8,898
Indigo, wet:				
British India			5,445	
Singapore	346,299	13,779	4,409	2,646
Other countries	127			
Total	346,426	13,779	9,854	2,646

TABLE 52.—*Egypt: Imports and reexports of coal-tar dyes, 1923*

	Pounds	Value
IMPORTS		
Synthetic indigo:		
United Kingdom	4,478	[illegible]
Belgium	5,884	[illegible]
France	68,263	[illegible]
Germany	230,537	[illegible]
Switzerland	267,259	[illegible]
United States		
Total	576,419	[illegible]
Other coal-tar dyes:		
United Kingdom	6,920	[illegible]
Belgium	24,830	[illegible]
France	5,088	[illegible]
Germany	224,918	[illegible]
Switzerland	36,563	[illegible]
Syria	578	[illegible]
United States		
Other countries	1,411	[illegible]
Total	300,310	[illegible]
REEXPORTS		
Synthetic indigo	1,766	[illegible]
Other coal-tar dyes	4,200	[illegible]

£ E. Par = $4.943; applying the percentage of the fluctuation of the pound sterling for 1923, or 93.90 per cent = $4.646.

INDIA

India, with its large population, ranks among the world's leading consumers of dyes. An analysis of the German dye export figures for 1913, the year of maximum exportation for that country, shows that British India was fifth among the world's nations receiving German dyes by quantity (15,008,916 pounds) and sixth by value ($3,168,060). As it is primarily a cotton-consuming country, cotton dyes constitute the great majority of imports, and with continued expansion in cotton manufacturing it promises to become an increasingly large market for synthetic dyes. A few natural dyes are extensively used, particularly natural indigo. In 1907 and 1908, 405,900 acres of indigo were under cultivation, the exports in that year amounting to 3,249,000 pounds, valued at $2,665,766. This product is now, however, relatively unimportant as an export item, being unable to compete with synthetic indigo in the world's market. Synthetic indigo is even imported into the country.

As an indication of the position occupied by India among the dye-consuming nations, imports for the pre-war year, 1913, totaled 16,923,607 pounds, valued at $3,741,031, of which "alizarin dyes made up nearly 25 per cent by value and 38 per cent by weight." Imports in 1922 were 11,731,237 pounds, valued at $11,798,262, with red as the prevailing color, led by alizarin paste, used for the production of turkey red. In 1914, 72 per cent of the alizarin dyes came from Germany and 15 per cent from the United Kingdom.

Estimates for the imports of the individual leading dyes for 1922 are as follows: Alizarin, 3,600,000 pounds; Congo red, 2,100,000 pounds; and Sulphur black, 1,000,000 pounds. The imports of Congo red are reported to exceed all other direct cotton dyes, while the imports of sulphur black similarly exceed all other Sulphur colors

s have a less extensive consumption; they find applica-
on, silk, jute, and coir. The principal members of that
India include Magenta, Auramine, Methyl violet, and
een; in the case of the latter two dyes, the trade is accus-
ge crystals.

are imported for wall paper and ceremonial powders,
e dyes are in small demand. As to methods of dyeing,
leads, followed by piece and raw stock dyeing. Consid-
printing with wooden blocks is also carried on. Bombay,
of the large number of cotton mills in that Province, is
leading Indian port for the importation of coal-tar dyes.
buting dye center for coastwise and country shipments.

f import trade by Germany.—An examination of the import
itish India shows that Germany in 1921 and 1922 regained
of the import trade which had been taken over by Great
United States, and Switzerland during the war. Accord-
n official figures, more than three-fourths of the dye im-
4, both by weight and value, originated in Germany. In
ar before Germany reentered the world's markets, imports
dyes into India were insignificant. In 1921, however,
ared in the world's markets and comprised slightly over
that year's imports into India, increasing to about one-
mports in 1922. The increase in Germany's share in the
e is reflected in a conspicuous drop in the 1922 dye im-
mpared with 1921, from the United Kingdom and even
n the United States. Imports from the United Kingdom
led 3,613,820 pounds, valued at $3,619,734; they declined
,960,634 pounds, valued at $3,107,969. The decrease in
of dyes from the United States is still more striking; in
mounted to 2,019,871 pounds, valued at $2,831,326, as
vith 1922 figures of 723,285 pounds and $1,029,090,

ndia: Imports of coal-tar dyes and exports of natural indigo, British India, 1923

tar dyes year ended 31, 1923	Pounds	Exports of natural indigo year ended Mar. 31, 1923	Pounds
	5,285,661		
	8,741,929		
	92,232		
	14,119,822		
		To—	
om	1,326,261	United Kingdom	86,128
	9,922,018	Asiatic Turkey	129,808
	1,002,955	Persia	63,728
	53,259	Japan	41,216
	726,391	Egypt	129,136
s	1,088,938	Other countries	57,904
	14,119,822	Total	507,920

TABLE 54.—*Mexico: Imports of coal-tar, May, 1920, and May, 1921*

	May, 1920		May, 1921	
	Pounds	Value	Pounds	Value
Aniline, alizarin (natural and artificial) and anthracene colors:				
United States	14,198	$5,507	130	67
Germany	5,244	2,423	4,980	847
Great Britain			6,265	2,391
Total	19,442	7,930	11,375	3,305

One peso, average, May, 1920, $0.49352.
One peso, average, May, 1921, $0.48983.

TABLE 55.—*The Netherlands: Imports and exports of coal-tar dyes, 1922*

	1922	
	Pounds	Value
IMPORTS		
Aniline and other coal-tar dyes:		
Germany	3,035,734	$1,779,259
Belgium	48,501	28,903
Switzerland	191,800	153,900
All other countries [1]	171,959	61,905
	3,447,994	2,024,117
Synthetic indigo	368,168	93,140
EXPORTS		
Aniline and other coal-tar dyes:		
Germany	121,253	53,084
Great Britain	154,322	68,857
France	35,274	17,720
United States	57,320	43,724
Dutch East Indies	33,069	12,702
All other countries [1]	194,004	97,705
	595,242	319,832
Synthetic indigo	2,205	585

One ton, 2,204.6 pounds; 1,000 gulden, average for 1922, $384.90.

[1] Computed on difference between given total and individual countries.

TABLE 56.—*Persia: Imports and exports of indigo, years ended March 20, 1922, and March 20, 1923*

	Year ended Mar. 20, 1922		Year ended Mar. 20, 1923	
	Pounds	Value	Pounds	Value
IMPORTS				
Natural indigo:				
Afghanistan			62	$31
Great Britain	937	$955	168	39
British India	290,218	308,174	715,947	158,679
France	21	32		
Russia			72	64
Switzerland			344	308
European Turkey	128	205		
Total	291,304	309,366	216,700	159,961
Germany	94,210	134,015	114,586	98,559
Great Britain	111	251	56	33
British India	524	655	94,425	63,845
France			15	19
Russia	1,928	2,579	7	4
Switzerland			2,744	1,973
Total	96,774	137,500	211,843	165,382

TABLE 56.—*Persia: Imports and exports of indigo, years ended March 20, 1922, and March 20, 1923*—Continued

	Year ended Mar. 20, 1922		Year ended Mar. 20, 1923	
	Pounds	Value	Pounds	Value
EXPORTS				
Natural indigo:				
Afghanistan			963	$577
Russia	888	$873	28,145	26,331
Mascoti			98	35
Oman			1,408	553
Total	888	873	30,614	27,499
Synthetic indigo:				
Afghanistan			295	607
Russia			7,709	7,525
Switzerland			7	9
Total			8,011	8,141

One kran approximately equivalent to French franc.
Average exchange franc 1922, $0.08193.
Average exchange franc, 1923, $0.0607.
One Batman—2.970 kilos—6.55 pounds.

TABLE 57.—*Spain: Imports of coal-tar dyes, 1922, and first six months of 1923*

	1922		1923 (6 months)	
	Pounds	Value	Pounds	Value
Colors derived from coal and other artificial colors in powder or crystal, including thio carbon	1,726,320	$1,574,904	983,618	$892,064
Indigo, synthetic	325,258	171,061	105,226	54,983
Colors derived from coal in paste or solid containing 50 per cent water	65,049	31,973	26,881	13,127

One peseta, average of 1922, $0.1548.
One peseta, average, January to June, 1923, $0.1538.

TABLE 58.—*Sweden: Imports and exports of coal-tar dyes, 1921*

	1921	
	Pounds	Value
IMPORTS		
Alizarin colors	42,531	$43,393
Aniline and other coal-tar colors	914,475	793,064
Indigo:		
Artificial	23,713	14,133
Natural	22	47
Other indigo colors	3,309	675
EXPORTS		
Alizarin colors	82	272
Aniline and other coal-tar colors	64,921	60,819

One krona, average of 1921, $0.225.

Reparation Dyes [10]

1. Under the terms of the treaty of Versailles provision was made for deliveries in kind by Germany. Annex VI to Part VIII of the treaty dealt with the delivery of dyes and pharmaceutical products. The full text of Annex VI follows:

I

Germany accords to the Reparation Commission an option to require as part of reparation the delivery by Germany of such quantities and kinds of dyestuffs and chemical drugs as the commission may designate, not exceeding 50 per cent of the total stock of each and every kind of dyestuff and chemical drug in Germany or under German control at the date of the coming into force of the present treaty.

This option shall be exercised within 60 days of the receipt by the commission of such particulars as to stocks as may be considered necessary by the commission.

II

Germany further accords to the Reparation Commission an option to require delivery during the period from the date of the coming into force of the present treaty until 1st June, 1920, and during each period of six months thereafter until 1st January, 1925, of any specified kind of dyestuff and chemical drug up to an amount not exceeding 25 per cent of the German production of such dyestuffs and chemical drugs during the previous six months' period. If in any case the production during such previous six months was, in the opinion of the commission, less than normal, the amount required may be 25 per cent of the normal production.

Such option shall be exercised within four weeks after the receipt of such particulars as to production and in such form as may be considered necessary by the Commission; these particulars shall be furnished by the German Government immediately after the expiration of each six months' period.

III

For dyestuffs and chemical drugs delivered under paragraph 1, the price shall be fixed by the commission, having regard to pre-war net export prices and to subsequent increases of cost.

For dyestuffs and chemical drugs delivered under paragraph 2, the price shall be fixed by the commission, having regard to pre-war net export prices and subsequent variations of cost, or the lowest net selling price of similar dyestuffs and chemical drugs to any other purchaser.

IV

All details, including mode and times of exercising the options, and making delivery, and all other questions arising under this arrangement shall be determined by the Reparation Commission; the German Government will furnish to the commission all necessary information and other assistance which it may require.

V

The above expression "dyestuffs and chemical drugs" includes all synthetic dyes and drugs and intermediate or other products used in connection with dyeing, so far as they are manufactured for sale. The present arrangement shall also apply to cinchona bark and salts of quinine.

DYES

As regards dyestuffs the intention of the Reparation Commission was as follows:

1. To place at the disposal of the Allied and Associated Powers the dyes immediately necessary for their industries.

2. To furnish a continuous supply up to January 1, 1925.

Following the signing of the treaty, consideration was given to Annex VI in view of the urgent needs of dyes by the Allied countries.

[10] The information on reparation dyes is taken from "Report on the Works of the Reparation Commission from 1920–1922, printed and published by His Majesty's Stationery Office, 23 Imperial House, King's Way, London, WC2.

The subcommittee, composed of dye experts from the United States, Great Britain, Italy, and Belgium, was appointed, as was also a German expert committee, comprising representatives of the leading German dye firms and presided over by Herr Carl von Weinberg.

Agreement was made at the first meeting on August 8, 1919, at Versailles, to take an inventory of stocks on hand in the German factories as on August 15. The inventory of dyes on hand submitted by Germany totaled 20,706,114 kilos (20,380 tons[11]) and in addition 816,610 kilos (804 tons) of intermediates. The following table shows the stocks of dyes and intermediates on hand in each of the German factories on August 15, 1919:

TABLE 59.—*Stock of dyestuffs in German factories, August 15, 1919*

Factory	Dyestuffs	Intermediates	Total dyestuffs and intermediates	50 per cent of the total of dyestuffs and intermediates
	Kilograms	*Kilograms*	*Kilograms*	*Kilograms*
A. G. F. A. (Berlin)	1,077,759,000	47,963,000	1,125,722,000	562,861,000
Badische	7,984,435,000	143,494,000	8,127,929,000	4,063,964,500
Bayer	5,444,805,000	27,433,000	5,472,238,000	2,736,119,000
Cassella	2,235,683,000	45,536,000	2,281,219,000	1,140,609,500
Griesheim	506,330,300	49,167,400	555,497,900	277,748,950
Grunau		1,992,000	1,992,000	996,000
Jäger	22,540,000		22,540,000	11,270,000
Kalle	339,855,300	25,325,000	365,180,200	182,590,150
Meister L. & B	2,566,721,158	473,601,200	3,040,322,358	1,520,161,179
Muehlheim	80,306,000	300,000	80,606,000	40,303,000
Weiler-ter-Meer	423,004,000	798,000	423,802,000	211,901,000
Wülfing Dahl	24,675,000	1,000,000	25,675,000	12,837,500
Grand total	20,706,113,958	816,609,600	21,522,723,558	10,761,361,779

In theory the option on these stocks could not be exercised until the treaty entered into force. None the less, in view of the urgent needs of France, Italy, and Belgium, it was decided, with the consent of Germany, in the course of a meeting of the Allies held in London for that purpose on September 15, 1919, to authorize the immediate withdrawal of 5,200 tons from the stocks of August 15. This agreement was ratified by the organization committee on September 17, the details governing the deliveries were arranged with the German experts at the beginning of October, and a protocol finally signed on November 3.

Deliveries on the 5,200-ton account began on November 22, 1919. After a prolonged consideration of the distribution of the remainder of the stocks on hand (August 15, 1919) it was decided to divide the dyes into groups and to base the percentage of distribution on the German export statistics of 1913. These figures were modified to allow for new conditions and for home consumption. The following table shows the percentage distribution:

TABLE 60.—*Percentages of distribution of dyestuffs—Balance of the stock of August 15, 1919*

Group	United States	Great Britain	France	Italy	Belgium
I. Alizarine red	25	35	16	16	8
II. Indigo	5	29	28	18	20
III. Vat dyes other than indanthrene blue G. C. D.	39	30	13	13	5
IV. Indanthrene blue G. C. D.	55	30	8	7	
V. Alizarine dyes other than red	37	30	14	14	5
VI. Direct cotton colors	15	25	23	20	17
VII. Developed cotton colors	20	25	26	20	9
VIII. Acid wool colors	15	25	28	20	12
IX. Chrome colors	20	30	23	18	9
X. Basic colors	15	25	25	23	12
XI. Sulphur colors	10	35	17	17	21
XII. Lake colors	25	25	25	15	10
Intermediates	20	30	21	19	10

[11] Except where otherwise stated, the "ton" is the long ton.

Orders for deliveries from the stocks on hand continued to be forwarded up to September 1, 1920, and the total deliveries of dye amounted to 9,889,650 kilos (9,733 tons).

Paragraph 2 of Annex VI gave the commission an option for each six monthly period for delivery "of any specific kind of dyestuff and chemical drug up to an amount not exceeding 25 per cent of the German production of such dyestuffs and chemical drugs during the previous six months' period." The option came into force with the treaty, that is, on January 10, 1920.

At a meeting held in January, 1920, the German experts proposed that the Allies should establish a program, to be carried out by Germany, of their real needs for three months and that the Reparation Commission should exercise its option on the monthly production. This proposal was accepted and a provisional protocol for its execution was signed on January 30, 1920. Since that date Germany has had to inform the commission each month of the production of the preceding month of all dyestuffs, as well as of the lowest prices at which they have been supplied to other purchasers. In practice the prices quoted are always those of the German internal market. The monthly lists of production are communicated to the interested Governments and they are given a certain time to pass orders up to the amount of the percentages attributed to them. These percentages were drawn up on the basis employed for the distribution of the balance of the stocks of August 15; they have been modified on more than one occasion, owing to unforeseen demands from Japan, and again owing to the provisional abandonment of deliveries by Japan and subsequently by the United States.

The two following tables show the percentage distribution by countries of 25 per cent of the daily production of dyes, (1) when the United States received them, and (2) after withdrawal of the United States.

TABLE 61.—*Percentages of distribution of the 25 per cent of the daily production of dyestuffs*

[United States included]

Group	United States	Great Britain	France	Italy	Belgium
I. Alizarin red	25	35	16	16	8
II. Indigo	5	35	23	23	9
III. Vat dyes other than indanthrene blue G. C. D	42	35	9	9	5
IV. Indanthrene blue G. C. D	60	35	5		
V. Alizarin dyes other than red	45	35	8	8	4
VI. Direct cotton colors	15	25	25	18	17
VII. Developed cotton colors	28	30	18	13	8
VIII. Acid wool colors	15	33	26	15	11
IX. Chrome colors	25	33	18	13	8
X. Basic colors	20	30	20	20	9
XI. Sulphur colors	10	35	17	17	11
XII. Lake colors	30	30	15	15	10
Intermediates	20	30	21	19	10

TABLE 62.—*Existing percentages of distribution of the 25 per cent of the daily production of dyestuffs*

Group	Great Britain	France	Italy	Belgium
I. Alizarin red	45	15	25	15
II. Indigo	37	20	23	20
III. Vat dyes other than indanthrene blue G. C. D	50	20	20	10
IV. Indanthrene blue G. C. D	35	25	25	15
V. Alizarin dyes other than red	55	20	17	8
VI. Direct cotton colors	34	26	25	15
VII. Developed cotton colors	42	25	21	12
VIII. Acid wool colors	37	30	19	14
IX. Chrome colors	43	20	25	12
X. Basic colors	38	25	25	12
XI. Sulphur colors	35	15	20	30
XII. Lake colors	40	20	25	15
Intermediates	37	26	24	13

After the expiration of the time limit the remaining dyes were offered to the different countries without regard to the percentages, and withdrawals were also made for deliveries to countries having no percentage (the Serb-Croat-Slovene State and Greece):

The drawing up of the quarterly program of the needs of the Allied countries for the purpose of the agreement, which was to replace the provisional agreement of January 30, 1920, presented serious difficulties, and the protocol of that date was first renewed on April 28, 1920, and a second time in a slightly different form on May 31.

The protocol for the delivery of dyes of May 31, 1920, follows:

Pending the final execution of the agreement outlined at the meeting of the dyestuff subcommission of the Reparation Commission, January 28, 1920, or of a similar agreement, the German Government undertakes to deliver to the Reparation Commission from June 1, 1920, forward, 25 per cent of the German daily production of dyestuffs.

It will likewise deliver intermediate products used in dyeing and printing in such quantities as shall equal the quantities of those same products delivered to the various countries before the war for the same uses.

The prices at which these dyestuffs and intermediate products will be delivered shall be the lowest price at which these same dyestuffs and intermediate products have been offered [12] during the same month to any buyer, German or other.

These deliveries will be credited to Germany in the reparation account.

It is understood that the present agreement in no way constitutes a renunciation by the Reparation Commission of any of the rights conferred upon it by the treaty of Versailles, particularly as regards the paragraphs above concerning intermediate products and prices.

(Signed) DUBOIS.
D'AMELIO.
BERGMANN.

N. B.—This protocol and all the other protocols and agreements concerning Annex VI having been prepared in the French language, and the French text being the only one signed by the Germans, the French text alone is authentic.

The German factories continued to turn out large quantities of the simpler dyestuffs, which were also being produced in United States, British, French, and Italian factories, with the result that a proportion of them remained at the disposal of the commission. In order not to disturb the markets by putting these dyestuffs on sale, the commission negotiated the sale of the untaken balances to the Association of German Dyestuff Manufacturers (Interessengemeinschaft) and on February 3, 1921, an agreement was signed under which this association bought them back at 75 per cent of the value shown on the monthly lists of production. This contract dealt with all the balances of the 25 per cent of production from February to May, 1920, and the sum paid to the commission amounted to 44,384,420 paper marks (3,026,100 gold marks).

In the case of many types of dyestuffs 25 per cent of the German production was not sufficient to satisfy the needs of the Allied countries, and, indeed, many of the products for which there was a demand were not even manufactured. The commission sought to fill this gap. The chief requirements were to enable the Allied distributing organizations to satisfy their own clients, whatever might be the quantity called for, and to provide the materials at a reasonable price. Several conferences were held with the German experts in July, 1921. It appeared desirable, in order to interest the German factories in the smooth working of the agreement which was under negotiation, to make a concession on the price of the quantities in excess of those the delivery of which was provided for in the earlier protocols, and it was in this spirit that the supplementaryagreement of the 19th August, 1921, was signed after long negotiations.

[12] In the French text "tarifés."

This agreement follows:

APPENDIX XXVIII

AGREEMENT SUPPLEMENTARY TO THE DYESTUFFS PROTOCOL OF MAY 31, 1920

PARIS, *19th August, 1921.*

The following clauses shall be applied to the protocol of 31st May, 1920, which governs, in so far as dyestuffs are concerned, the execution of paragraph 2, Annex VI to Part VIII of the treaty of Versailles.

ARTICLE 1

The I. G. of the German dye factories, whilst continuing to hold at the disposal of the Reparation Commission 25 per cent of the amount of dyestuffs manufactured each month, agrees to deliver, as far as possible, on reparation account, dyestuffs asked for in quantities superior to 25 per cent of the production of such dyes.

However, the total value of the dyes delivered on reparation account out of the production of any one month shall not exceed 25 per cent of the total value of the total production for that month.

ARTICLE 2

Those quantities superior to 25 per cent of the production of each dyestuff shall be debited in reparation account at the lowest price that the I. G. of the German dye factories shall have sold at [12] in each of the receiving countries during the month preceding the month of delivery or during the month of delivery, but always at the lower of these two prices.

However, the prices fixed by the protocol of 31st May, 1920, shall be applied to a minimum quantity of each dyestuff to be delivered in accordance with articles 1 and 2, such minimum quantity to be agreed upon jointly by the Reparation Commission and the I. G. on the basis of the production of each dyestuff during the 15 months from 1st February, 1920, to 30th April, 1921 (see letter from I. G. attached).

ARTICLE 3

For such dyestuffs as the amount asked for is liable to exceed 25 per cent of the production, firm orders shall be given by each Allied and Associated Power within one month of the signing of the present agreement for the first three months' period and for the succeeding three-monthly periods during the last month of the preceding period. The quantities thus ordered shall not exceed the needs of the consuming industries of each country.

ARTICLE 4

The Reparation Commission recognizes that dyestuffs delivered on reparation account should not be reexported, and will therefore ask the Governments of the Allied and Associated Powers receiving dyestuffs to give to their respective distributing organizations the instructions necessary to prevent, as far as possible, this reexportation.

ARTICLE 5

As to dyestuffs of which deliveries are not to exceed 25 per cent of the production and of which 25 per cent of the production is held at the disposal of the Reparation Commission, the commission agrees that firm orders for these shall be given within 60 days after receipt of the monthly lists of production. Quantities for which firm orders are not given within this period shall automatically remain at the free disposal of the I. G.

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[12] In the French text "au plus bas prix que l'I. G. * * * aura pratiqué," which is less restrictive than the term "sold."

ARTICLE 6

There shall be left at the free disposal of the I. G.—
(*a*) On the signing of this agreement the reliquats of the seven months from 1st June to 31st December, 1920;
(*b*) Within 30 days of the date of signature of this agreement, the reliquats of the months of January and February, 1921;
(*c*) Within 60 days of the date of signature of this agreement, the reliquats of the three months from 1st March to 31st May, 1921.

ARTICLE 7

The Reparation Commission will forward to the "Centrale des Usines de Matieres Colorantes" at Frankfort within 30 days of the date of this agreement a provisional list of specified dyestuffs, which in future will no longer have to be held at the disposal of the Reparation Commission. This list will be subject to change as the Reparation Commission may direct.
It is, moreover, understood that the monthly lists of production handed over to the Reparation Commission by the "Centrale" of Frankfort shall continue to show the production of all dyestuffs manufactured, whether or not they are to be held at the disposal of the commission.

ARTICLE 8

The present agreement will remain in force until revoked by the Reparation Commission. Notice of such revocation must be given at the beginning of a three-monthly period to take effect for the next period.

ARTICLE 9

The I. G. will do the necessary to be assured that the German Government will not oppose the present agreement.
For the I. G. of German synthetic dyestuff factories.

(Signed) SALVAGO RAGGI.
B. A. KEMBALL-COOK.
C. VON WEINBERG.

ANNEX TO AN AGREEMENT SUPPLEMENTARY TO THE PROTOCOL OF MAY 31, 1920

Letter from the I. G. of German synthetic dyestuff factories to the bureau for dyestuffs and pharmaceutical products of the Reparation Commission:

PARIS, *12th July, 1921.*

The I. G. declares that it will carry out article 2 of the supplementary agreement to the protocol of 31st May, 1920, concerning dyestuffs, as follows:
When a product is concerned which has not been manufactured during the 15 months taken as a basis, and such manufacture is undertaken to fill an order from the Allies, during the first three-monthly period 50 per cent of the amount delivered will be priced at the price prevailing on the German interior market. This, however, does not apply to products never manufactured before the coming into effect of the treaty.
When a product is concerned which was manufactured during the 15 months taken as a basis, but in quantity considered insufficient, the lower price will be applied to a quantity to be determined by common agreement, which quantity will be between the 25 per cent of the average monthly production of the 15 months and 50 per cent of the amount ordered.
However, the lower price will always be applied to a quantity equal at least to 25 per cent of the actual production.
For the I. G. of German synthetic dyestuff factories.

(Signed) C. VON WEINBERG.

This agreement enabled the Allied distributing agencies to place quarterly orders for their requirements and to provide for reserves. It only binds Germany to deliver "as far as possible," and does not fix the price in advance. However, in nearly all cases the syndicate manufactured the desired products, and with few exceptions prices were reasonable.

The quarterly orders under this agreement up to December, 1922, are indicated below:

	Tons (metric)
July–September, 1921	[illegible]
October–December, 1921	[illegible]
January–March, 1922	[illegible]
April–June, 1922	[illegible]
July–September, 1922	[illegible]
October–December, 1922	[illegible]

The agreement of August 19, 1921, was modified on June 12, 1922, to facilitate the calculation of prices.

This amendment, given below, was extended "sine die" on December 15, 1922.

PARIS, *June 12, 1922.*

PROVISIONAL AMENDMENT TO THE SUPPLEMENTARY AGREEMENT OF AUGUST 19, 1921, RELATIVE TO DYESTUFFS

I. To facilitate the application of the supplementary agreement of August 19, 1921, it is decided that the following rules will apply to the quarterly orders July-September, and October-December, 1922. In so far as these two periods are concerned, the text which follows shall constitute a provisional amendment to such clauses of the supplementary agreement as might be contradictory to the present text.

II. All quarterly orders for July-September and October-December, 1922, will be invoiced as follows: 50 per cent at the price fixed by the protocol of May 31, 1920; 50 per cent at the lowest price that the I. G. shall have sold at in each of the receiving countries during the month preceding the month of delivery or during the month of delivery, but always at the lower of these two prices.

III. Upon receipt of the quarterly orders, the Centrale will furnish, for information, the export prices quoted for the countries interested at the time the orders are placed.

IV. To obtain the 25 per cent of the daily production, the quantities ordered in the quarterly orders will be deducted from the total actual production of the factories during the corresponding quarter. The 25 per cent of the difference between the actual production and the quarterly orders will appear in the production lists of the months from July to December, 1922. This entire 25 per cent will be at the disposal of the Reparation Commission in accordance with the Protocol of May 31, 1920.

(Signed) LEON DELACROIX.
JOHN BRADBURY.
VON WEINBERG.

Two other agreements of minor importance included: (1) An agreement between the German factories and the French holders of pre-war contracts of dyes; (2) a Belgian-German agreement under which Belgium could order on reparation account, at open market prices, any dyes not obtainable within its share of the 25 per cent of daily production or within the quarterly orders.

A question of interpretation arose on the intermediates in paragraph 5 of Annex VI, as the French and English texts were not identical. The question was whether the commission's option extended to intermediates used in making dyes or was limited to those produced used in dyeing and printing. The Reparation Commission provisionally limited its option to the intermediates used in dyeing and printing. The Allied experts considered it desirable to encourage the dye makers

in their respective countries to produce their own intermediates and, in order to avoid their use in dye making, the option was restricted to the pre-war consumption by the Allied countries. In order to provide for new products and such products as naphthol A. S., the provision was further modified. Group I includes intermediates used in dye making. Orders were passed without restriction at the lowest price of the German factories, provided that the products be used only for dyeing and printing and not reexported. Group II includes products specially employed in dyeing or printing. Option is accorded at prices provided for by the treaty up to 25 per cent of production, and quantities in excess can be ordered at the lowest price quoted by Germany in the country placing the order.

Shortly after the treaty came into force the Reparation Commission organized a bureau for dyestuffs and pharmaceutical products which works in liaison with the Allied expert committee, while Germany created at Frankfort a service (Zentrale der Farbstoff Fabriken, under the direction of Herr Muehlen), in touch with the German expert committee. Since the Reparation Commission allots dyes as a general rule only to Allied Governments or to agencies specifically appointed for this purpose by the Governments, France and Italy each set up a "Union des Producteurs et Consommateurs de Matieres Colorantes" for the receipt and distribution of reparation dyes. Great Britain appointed first of all the Central Importing Agency and later the British Dyestuffs Corporation. The Belgian Government itself receives and distributes its dyestuffs. The United States gave a mandate to the Textile Alliance (Inc.) of New York, but withdrew the mandate on the 14th December, 1921, without replacing the Textile Alliance. Nevertheless, the commission at that time decided, in consideration of the requirements of the United States industry and in the absence of objection from the United States Government, to continue to deliver to the Textile Alliance the portion previously assigned to the United States. On the 29th November, 1922, the Textile Alliance informed the commission that it renounced any right to order reparation dyes, and the share of the United States was then distributed between Great Britain, France, Italy, and Belgium.

The Frankfort Zentrale draws up every month lists indicating, in the case of each product manufactured in Germany during the preceding month, 25 per cent of the production and the lowest current price. These lists are immediately communicated by the dyestuffs bureau to the different Governments, which have 30 days in which to forward their orders up to the amount of their percentages to the Zentrale at Frankfort. After 30 days the dyestuffs bureau draws up a new list indicating the quantities still available. This list is immediately communicated to the Allied Governments, who have a further period of 30 days within which to forward to the bureau their orders for these balances. The balances are distributed a first time in proportion to the orders received on the tenth day and then later distributed in accordance with the orders without regard to percentages. Quantities not ordered within the total period of 60 days remain at the disposal of Germany. Orders for the 25 per cent of the daily German production must be carried out by Germany within three weeks except in the case of "force majeure." An invoice accompanies each consignment, and the amount, after conversion into gold marks, is then credited to Germany and debited to the receiving country on reparation account. As regards the United States, which has no reparation account, payments were made in dollars to the commission by the receiving agency. The same method was adopted for the dyes sold directly to the Textile Alliance.

Certain Allied countries were put to inconvenience through the reexportation of dyestuffs made by other Allied countries, and requested the commission to take steps to prevent such reexports. The attitude of the commission was defined in a letter addressed to the delegations of all the interested countries, the gist of which is contained in the two following extracts:

Dyes received subsequent to August 9, 1921:

It is definitely understood that such dyes are ordered for domestic consumption and are not to be reexported to countries receiving dyes through the medium of the Reparation Commission. In distributing these dyes to domestic consumers the receiving countries are expected to bring home this understanding to purchasers in such a way as to make it practically effective.

* * * * * * * *

Dyes delivered before August, 1921:

If practicable, the commission would be desirous of having the same restrictions as to reexportation of these dyes as are adopted for the dyes delivered since August. As regards dyes ordered under the supplementary agreement of the 19th August, 1921, or its amendment, the question of reexportation was regulated by article 4 of the former.

The deliveries of the dyes by the commission to the various countries up to December 31, 1922, are given below:

	Quantity (kilos)	Value (gold marks)
United States Textile Alliance:		
Stock	1,948,958	2,102,913.21
Daily production	280,734	1,499,291.13
Supplementary agreement	161,823	1,281,132.53
Total	2,391,515	4,883,336.87
Great Britain:		
Stock	2,923,453	3,806,101.03
Daily production	2,280,452	5,774,614.66
Supplementary agreement	955,678	4,653,776.82
Total	6,159,583	14,234,492.51
France:		
Stock	2,259,829	2,871,672.16
Daily production	1,826,247	8,687,467.25
Supplementary agreement	127,207	796,465.34
Pre-war contracts	28,549	86,419.32
Total	4,241,832	12,442,024.07
Belgium:		
Stock	1,103,195	1,202,216.24
Daily production	1,732,281	4,040,346.14
Supplementary agreement	1,158,028	4,245,975.63
Total	3,993,504	9,488,538.01
Italy:		
Stock	1,566,214	1,811,725.19
Daily production	3,180,866	11,106,367.33
Supplementary agreement	403,804	1,787,488.49
Total	5,150,884	14,705,496.99
Japan:		
Stock	88,001	84,467.41
Daily production	591,312	2,565,227.76
Total	679,313	2,629,715.17
Serb-Croat Slovene State: Daily production	10,140	22,428.61
Greece: Daily production	63,006	231,084.79
Total:		
Stock	9,889,650	11,836,116.43
Daily production	9,965,036	33,947,022.97
Supplementary agreement	2,809,540	12,764,730.81
Pre-war contracts	28,549	86,419.32
Grand total	22,689,775	58,657,311.25

TABLE 63.—*Reparation dyes delivered to December 31, 1923*

	Kilos	Gold marks
United States	2,391,589	4,875,568
Great Britain	7,664,993	19,197,311
France	4,276,533	12,515,487
Italy	6,274,601	18,722,218
Belgium	4,219,215	9,913,905
Japan	679,313	2,629,715
Greece	67,006	254,209
Serbia	10,140	22,429
Total	25,583,390	68,130,842

PHARMACEUTICAL PRODUCTS

The questions involved in the case of pharmaceutical products were intrusted to a subcommittee of experts. At the first meeting, held September 12, 1919, the United States, Great Britain, France, Italy, and Belgium were represented. The German experts suggested September 20, 1919, as the date on which inventories should be taken of stocks on hand, and this date was agreed upon. The French and Belgian experts desired prompt exercise of the option, in view of the needs of pharmaceuticals in their countries. The United States and British experts stood for a compliance with legal limitation of the treaty, whereby the option could be exercised only by the commission itself, i. e., after the treaty came into force.

On December 9, 1919, Germany reported the inventories of pharmaticals, and the experts met on January 5 to 10 for their examina-n. It was found that the quantities were too low for certain ducts and that other products covered by the treaty were not ed.

As a result of a discussion on January 30, 1920, and the explanations red, the German inventories were accepted "en bloc," to which cks of certain products were to be added. In the case of codeine l cocaine, only half of their stocks were declared, as it was not ved that the patents covering their synthesis were being operated. thetic pharmaceuticals were defined as "all organic products ch are not natural or which are not obtained by simple extraction m a natural product and which are employed in therapeutics." After the treaty came into force pharmaceuticals were dealt with the same manner as dyes. A distribution organization for pharceutical products was maintained at Frankfort, Germany.

Agreement was made on April 9, 1920, for the distribution of pharceuticals on the basis of pre-war imports, and on April 12 the ied and German experts signed a protocol governing the delivery 50 per cent of the stocks.

The deliveries were modified as a result of the abandonment of their pective shares by the United States and Great Britain and of a uest of Japan to participate. Percentages were allotted to France, y, and Belgium, and Japan received a small fixed amount. On gust 28, 1920, the option on stocks was exercised, the total deliv-s amounting to 93,776 kilos (92 tons).

was decided, in agreement with Germany, to exercise the option on the production in a manner which differed slightly from that stipulated in the ty; it was agreed that Germany should forward monthly to the commission t of the quantities manufactured in the course of the preceding month and orders for 25 per cent of this production should be forwarded immediately. protocol of October 19, 1920, governs these deliveries:

PARIS, *October 19, 1920.*

PROTOCOL FOR THE DELIVERY OF PHARMACEUTICAL PRODUCTS

he German Government, in execution of paragraph 2, Annex VI, Part VIII of treaty of Versailles, undertakes to deliver to the Reparation Commission synthetic pharmaceutical products and salts of quinine up to an amount not eding 25 per cent of the German production manufactured from July 1, 1920, ard.

he production of cocaine and codeine, however, will be delivered only up to mount of 12.5 per cent of the total production of these products.

he prices at which these products shall be delivered shall in principle be the st net selling price at which these products have been quoted [14] during the th of their production to any other purchaser (German or otherwise). The aration Commission, however, reserves the right to fix the prices, accordto the provisions of paragraph 3, Annex VI, Part VIII of the treaty of Verles, if it considers that the prices charged by Germany are excessive.

hese deliveries will be credited to Germany in the reparation account.

he present agreement, until revoked or modified by the Reparation Comion, will govern all future deliveries of pharmaceutical products under the risions of the treaty above quoted.

is understood that in making the present agreement the Reparation Comion reserves all the rights conferred upon it by the treaty of Versailles.

(Signed) DUBOIS.
THEUNIS.
BERGMANN.

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the French text "les prix les plus bas auxquels ces memes produits ont ete tarifes."

The distribution of these quantities among the different Allies gave rise to long discussions and was subjected to modifications when the United States and Great Britain provisionally renounced their right to participate. For a few months Japan received fixed quantities, the balance being distributed between France, Italy, and Belgium in proportions which will be found in the following table:

PERCENTAGE DISTRIBUTION OF THE 25 PER CENT OF THE DAILY PRODUCTION OF PHARMACEUTICAL PRODUCTS SINCE JULY, 1920

Titles of the groups:

I. Quinine and its salts (No. 380 A of the German customs tariff of 1913).

II. Salicylic and benzoic acids and their salts (No. 317 N).

III. Alkaloids other than quinine and the glucosides (No. 380 B).

IV. Ethyl ether and the esters (No. 382).

V. Chloroform and chloral hydrate (No. 382).

VI. General synthetic products (Nos. 346 F, 346 G, 278, 317 G, 350, 351, 383, 390).

	Groups					
	I	II	III	IV	V	VI
France	33.0	42.5	42.5	57.5	40.0	33.3
Italy	60.5	43.0	42.5	17.0	40.0	33.3
Belgium	6.5	14.5	15.0	25.5	20.0	33.3

Rumania, the Serb-Croat-Slovene State, and Greece receive pharmaceutical products drawn from the quantities of which the other countries do not avail themselves, quantities which are relatively important in the aggregate owing to the development of the pharmaceutical industry in France and in Italy.

Rumania, the Serb-Croat-Slovene State, and Greece, in particular, urgently requested the delivery of salts of quinine and, the German manufacture of this product having greatly declined since the war, several special agreements were made for the delivery of a total quantity of over 56 tons.

The table below shows the deliveries of pharmaceutical products made to the different countries up to December 31, 1922:

TABLE 64.—*Pharmaceuticals delivered to December 31, 1922*

	Quantity (kilos.)	Value (gold marks)		Quantity (kilos.)	Value (gold marks)
France:			Japan:		
Stock	29,879	176,148.67	Stock	1,401	2,696.13
Daily production	26,431	189,527.48	Daily production	16,108	122,688.57
Total	56,310	365,676.15	Total	17,509	125,384.70
Italy:			Serb-Croat-Slovene State:		
Stock	49,507	481,731.93	Daily production	123,445	1,370,528.99
Daily production	268,797	2,073,392.82	Greece: Daily production	201,194	1,709,134.19
Total	318,304	2,555,124.75	Rumania: Daily production	80,790	5,608,020.39
Belgium:			Grand total	1,013,847	13,500,944.19
Stock	12,989	145,241.00			
Daily production	203,306	1,398,533.93			
Total	216,295	1,543,774.93			

TABLE 65.—*Pharmaceuticals delivered to December 31, 1923.*

	Kilos	Gold marks		Kilos.	Gold marks
.....	57, 525	394, 399	Serbia.....	176, 093	2, 563, 340
.....	417, 180	3, 928, 279	Rumania.....	80, 790	5, 608, 020
.....	248, 892	1, 617, 427			
.....	17, 509	138, 385	Total.....	1, 299, 549	16, 891, 446
.....	301, 560	3, 041, 596			

ecember, 1923, it was reported that the I. G. agreed to resume reparation deliveries in kind under Annex VI of the Vereaty and later agreements with the Reparation Commission.

PART VI

APPENDIX

STATISTICS OF DOMESTIC IMPORTS AND EXPORTS

—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*

[Act of Sept. 8, 1916]

GROUP I, CRUDE (FREE)

	Years			
	1917		1918	
	Quantity	Value	Quantity	Value
c, which on being subjected to distillation portion distilling below 200° C. a quantity of than 5 per cent of original distillate..pounds..	151, 254	$9, 894	155, 236	$17, 260
l.....gallons..	61, 200	3, 105		
.....pounds..	3, 598, 733	341, 700	2, 673, 855	87, 570
.....do....	7, 665, 442	532, 529	8, 873, 271	779, 045
ote oil.....gallons..	9, 817, 085	786, 638	1, 545, 247	162, 869
having a solidifying point less than 79° C. .....pounds..	5, 206, 980	175, 554	3, 902, 731	130, 098
quinoline.....do....	12, 247	1, 480	9, 237	1, 036
e.....barrels..	6, 780	10, 745	13, 087	21, 200
.....do....	5, 926	12, 039	14, 029	29, 095
thocresol, and paracresol—purity less than 90 .....pounds..	20, 708	1, 404		
.....do....	9, 332	2, 928		
ucts found naturally in coal tar whether pro- ained from coal tar or other sources, n. s. p. f. .....pounds..		10, 448		2, 756
lates, which on being subjected to distillation portion distilling below 200° C. a quantity of s than 5 per cent of the original distillate .....pounds..		1, 502		10, 473
urity less than 25 per cent.....do....	(1)	(1)	18	5
, cumol fluorene, methylanthracene, and thalene.....pounds..	(1)	(1)		
rity less than 25 per cent.....do....	(1)	(1)		

	Years			
	1919		1920	
	Quantity	Value	Quantity	Value
c, which on being subjected to distillation portion distilling below 200° C. a quantity of than 5 per cent of original distillate..pounds..	1, 965, 289	$187, 788	192, 692	$19, 848
.....gallons..	18, 699	3, 994	15, 054	3, 945
.....pounds..	217, 865	5, 617	486, 619	10, 868
.....do....	6, 435, 650	557, 214	10, 318, 070	901, 381
te oil.....gallons..	11, 268, 379	1, 374, 217	18, 427, 152	3, 796, 399
having a solidifying point less than 79° C. .....pounds..	3, 239, 256	92, 265	15, 012, 096	530, 219
quinoline.....do....	165, 064	20, 543	863, 456	168, 800
.....barrels..	22, 339	38, 476	11, 901	24, 140
.....do....	3, 364	8, 598	8, 780	26, 022
thocresol, and paracresol—purity less than 90 .....pounds..	11, 200	1, 221		
.....do....	1, 195, 706	30, 768		
ucts found naturally in coal tar whether pro- ained from coal tar or other sources, n. s. p. f. .....pounds..	380, 525	6, 334	240, 096	14, 046
lates, which on being subjected to distillation portion distilling below 200° C. a quantity of s than 5 per cent of the original distillate .....pounds..	104, 568	10, 548		
urity less than 25 per cent.....pounds..	82, 669	2, 022	202, 569	16, 590
, cumol fluorene, methylanthracene, and thalene.....pounds..	15, 759	946		
rity less than 25 per cent.....pounds..	112	82		

t available by calendar year.

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*—Continued

GROUP I, CRUDE FREE—Continued

	Years			
	1921		1922	
	Quantity	Value	Quantity	Value
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate..pounds..	214,185	$22,849	311,914	[illegible]
Anthracene oil.....gallons..	12,776	5,019	13,308	[illegible]
Benzene.....pounds..	1,722,085	442,370	172,528	[illegible]
Cresol.....do....	3,353,882	253,886	3,756,651	[illegible]
Dead or creosote oil.....gallons..	33,239,432	4,736,618	41,866,767	[illegible]
Naphthalene having a solidifying point less than 79° C. .....pounds..	4,495,806	135,943	3,144,532	[illegible]
Pyridine and quinoline.....do....	72,515	11,367	118,973	[illegible]
Coal tar, crude.....barrels..	21,551	46,784	23,421	[illegible]
Pitch, coal tar.....do....	417	1,264	1,422	[illegible]
Metacresol, orthocresol, and paracresol—purity less than 90 per cent.....pounds..			3,962	[illegible]
Toluene.....do....			144,237	[illegible]
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f. .....pounds..	40,707	3,111	424,530	[illegible]
All other distillates which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate .....pounds..	7,310	959	439,727	[illegible]
Anthracene, purity less than 25 per cent.....do....	58,111	1,198	33,600	[illegible]
Acenaphthene cumol fluorene, methylanthracene and methylnaphthalene.....pounds..	100	64	66	[illegible]
Carbazole, purity less than 25 per cent.....do....				

	1923	
	Quantity	Value
Benzene.....pounds..	701,857	[illegible]
Dead or creosote oil.....gallons..	64,199,636	[illegible]
Napthalene, solidifying at less than 79° C.....pounds..	20,992,439	[illegible]
Coal tar, crude.....barrels..	10,131	[illegible]
Pitch, coal tar.....do....	4,644	[illegible]
Toluene.....pounds..	194,660	[illegible]
Acenaphthene, fluorene, methylanthracene, and methylnaphthalene.....do....	23,673	[illegible]
Anthracene, purity less than 30 per cent.....do....	869,780	[illegible]
Anthracene oil.....gallons..	31,198	[illegible]
Cumene, cymene.....pounds..	2	[illegible]
Metacresol, orthocresol, and paracresol, purity less than 90°.....do....	3,805	[illegible]
Pyridine.....do....	764,918	[illegible]
Xylene.....do....	126,488	[illegible]
All other distillates n. s. p. f., which on being subjected to distillation yield in the portion distilling below 190° C. a quantity of tar acids less than 5 per cent of the original distillate.....pounds..	5,761,011	[illegible]
All other products found naturally in coal tar, whether produced or obtained from coal tar or other sources, n. s. p. f.....pounds..	1,635,025	[illegible]

[1] First 9 months.

66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*

' II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; ABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21,

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
rs, dyes, or stains, photographic chemicals, medic- flavors, or explosives, n. s. p. f.:				
ls—				
Amidosalicylic—				
1917				
1918				
1919				
1920	11,199	$8,182	$1,507	18.42
1921				
1922				
1923				
Arsanilic—				
1923	223	3,345	1,855	55.47
Benzoic—				
1917	4,653	20,539	3,190	15.53
1918	1,791	14,060	2,154	15.32
1919	63	374	58	15.42
1920	250	1,087	160	15.58
1921	11,268	3,012	733	24.35
1922 [1]	100	365	57	15.68
1923	100	410	233	56.71
Carbolic (phenol) which on being subjected to distillation yields in the portion distilling below 206° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate—				
Crystal—				
1917	30,676	4,954	1,510	30.48
1918	148,261	47,085	10,769	22.87
1919				
1920				
1921	250	142	28	19.40
1922 [1]	280,224	30,414	11,568	38.03
1922 [2]	69,316	16,102	13,708	85.13
1923	126,618	21,389	20,627	96.44
Liquid—				
1917	314,585	24,246	11,502	47.44
1918	134,406	15,186	5,638	37.13
1919	2,061	264	91	34.52
1920	1,040	244	63	25.86
1921				
1922 [1]	1,702	1,801	313	17.36
1922 [2]	145,375	18,498	20,345	110.04
1923	2,815	257	338	131.67
Cinnamic—				
1923	112	389	222	57.02
Dichlorophthalic—				
1923	10	8	5	63.75
Phenylglycine orthocarboxylic—				
1923	17,376	74,492	42,187	56.63
Salicylic—				
1917	26,273	23,575	4,193	17.79
1918	117	112	20	17.62
1919				
1920				
1921				
1922 [1]	2,276	1,881	339	18.02
Salicylic and salts of, not medicinal—				
1923	1,107	854	547	64.07
Sulphanilic—				
1923	16	19	12	60.89
idonaphthol—				
1917				
1918				
1919	150	72	15	20.21
1920				
1921	11,025	9,990	1,774	17.76
1922				
1923				

[1] Act of 1916. [2] Act of 1922.

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals flavors, or explosives, n. s. p. f.—Continued.				
Amidophenol—				
1917				
1918				
1919	1,028	$2,417	$388	16.06
1920				
1921	14,623	11,699	2,120	18.12
1922				
1923				
Aniline oil—				
1917				
1918				
1919				
1920	220	72	16	22.68
1921	11,243	1,790	551	30.62
1922 (included in aniline oil and salts) [1]				
Aniline salt—				
1917				
1918	21,273	3,250	1,019	31.35
1919				
1920	4	1		25.00
1921	18,316	12,109	2,274	18.78
1922 (included in aniline oil and salts)				
Aniline oil and salts—				
1922 [2]	55	11	10	90.90
1923	30	220	123	55.95
Anthracene, purity of 25 per cent or more—				
1917				
1918				
1919	51,895	8,011	2,499	31.19
1920	648,095	87,413	29,314	33.54
1921	261,645	12,639	8,437	66.77
1922 [2]	2	2	1	62.00
1923				
Anthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
1921	127,427	78,255	14,924	19.07
1922				
1923				
Benzaldehyde—				
1917				
1918				
1919	24,472	17,790	3,280	18.44
1920	9,479	5,928	1,126	19.00
1921	1,056	465	96	20.65
1922 [2]	20	11	7	67.73
Benzaldehyde, not medicinal—				
Nitrobenzaldehyde	200	240	146	60.83
1923				
Benzidine, bensidine sulphate—				
1923	7	23	13	57.13
Benzylchloride—				
1917	5	7	1	16.66
1918				
1919	1,000	430	90	20.91
1920	150	22	7	32.05
1921				
1922 [1]				
Benzylchloride, benzalchloride, and benzoylchloride—				
1922 [2]	29	10	8	77.10
1923	10	22	13	58.18
Binitrotoluol—				
1917	61,632	10,471	3,111	29.71
1918	22,635	3,333	1,066	31.98
1919	6,896	1,331	372	27.95
1920	4,092	1,216	300	24.66
1921	1,164	155	52	33.77
1922				
1923				

[1] Act of 1916.

[2] Act of 1922.

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals flavors, or explosives, n. s. p. f.—Continued				
Binitrobenzol—				
1921	5	$3		19.33
1922				
1923				
Carbazole, purity of 25 per cent or more—				
1917				
1918				
1919				
1920	157	27	$8	29.56
1921				
1922[1]	8,820	3,865	800	20.70
1922[2]				
1923				
Dimethylaniline—				
1917				
1918				
1919	1,120	427	92	21.56
1920	22,400	15,968	2,955	18.51
1921				
1922[1]	23,565	3,828	1,163	30.39
1922[2]				
Dimethylaniline and benzylethylaniline—				
1923	1	2	1	58.50
Metacresol, orthocresol, and paracresol, purity of 90 per cent or more—				
1917				
1918				
1919				
1920	2,444	2,230	396	17.74
1921	556	341	65	19.08
1922[1]	2,224	107	72	66.96
1922[2]	1,008	167	162	97.24
1923	8,754	5,410	3,588	66.33
Methylanthraquinone—				
1917				
1918				
1919	3,147	2,643	375	14.20
1920	13,053	5,612	1,168	20.82
1921				
1922				
1923	977	1,221	740	60.60
Napthalene solidifying at 79° C. or above—				
1917	267,057	12,125	8,497	70.02
1918	2,795	171	96	55.87
1919	7,650	384	249	64.80
1920	3,697,582	416,172	154,845	37.21
1921	441,685	31,456	15,761	50.10
1922[1]	75,680	7,684	3,045	39.61
1922[2]				
1923	9,605	194	779	401.57
Naphthol—				
1917	1,027	1,069	186	17.40
1918				
1919				
1920				
1921	333,356	112,922	25,272	22.38
1922[1]	658	799	136	17.06
1922[2]				
Naphthol, alpha and beta not medicinal—				
1923	13,376	29,569	17,199	58.17
Naphthylamine—				
1917				
1918	11,761	5,985	1,192	19.91
1919				
1920	69,695	7,208	2,824	39.18
1921				
1922				
1923				
Naphthylenediamine—				
1923	5	6	4	60.83

[1] Act of 1916. [2] Act of 1922.

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals flavors, or explosives, n. s. p. f.—Continued				
Nitrobenzol—				
1917				
1918				
1919	21,513	$4,003	$1,138	28.44
1920	45,891	6,009	2,049	34.09
1921				
1922				
1923				
Nitronaphthalene—				
1917	18,102	7,758	1,616	20.83
1918				
1919				
1920				
1921				
1922				
1923				
Nitrophenylenediamine—				
1921	1,132	6,590	1,017	15.43
1922				
1923				
Nitrotoluol—				
1917				
1918				
1919	542	452	81	18.00
1920	684	359	71	19.78
1921				
1922				
1923				
Phenylenediamine—				
1917				
1918				
1919	2,746	1,769	334	18.88
1920	2,429	1,887	344	18.22
1921				
1922 [1]	6	16	9	37.62
1922 [2]				
1923				
Phenylhydrazine—				
1923	18	39	23	58.29
Phthalic anhydride—				
1917	98	1,853	280	15.13
1918				
1919				
1920				
1921				
1922 [1]	3,374	2,517	1,621	64.38
1922 [2]				
1923				
Resorcin—				
1917	134	672	104	15.50
1918				
1919				
1920	51,529	39,932	7,278	18.23
1921	109,658	75,022	13,995	18.65
1922				
1923	12,520	16,976	10,213	60.16
Tolidine—				
1923	5	6	4	60.83
Toluidine—				
1923	60	31	21	68.35
Tolylenediamine—				
1921	175	238	43	18.48
1922				
1923				
Xylidine—				
1917				
1918				
1919				
1920	56,047	41,237	7,587	18.40
1921				
1922				
1923	150	60	44	72.53

[1] Act of 1916.

[2] Act of 1922.

Imports of coal-tar products entered for consumption, calendar years 1917 to 1923—Continued

TIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, ied.

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
s. p. f., which on distillation, yield in the ing below 200° C. a quantity of tar acid re than 5 per cent of the original distillate:				
	1,550	$2,008	$340	16.93
	3,170	4,587	767	16.78
	85,474	36,041	7,543	20.93
	16,240	11,811	2,178	18.43
	328,601	33,784	13,283	39.32
	22,163	9,128	6,572	72.00
	245,119	30,328	33,939	111.58
f coal, blast-furnaces, oil-gas, and water- on being subject to distillation below ntity of tar acids equal to or more than the original distillate:				
	18,267	4,102	3,534	86.16
	195,757	36,383	33,713	92.66
ucts, obtained, derived, or manufactured part from the products provided for in :				
	193,021	17,395	7,465	42.43
	13,445	8,640	1,632	18.89
	51,214	39,861	7,260	18.21
	87,911	74,514	13,375	17.95
	87,207	41,965	8,475	20.19
	389,708	153,625	32,786	21.34
	187,377	61,967	47,198	76.17
	1,436,983	330,514	282,371	85.43
s or sulfoacid salts of Group II:				
	100	87	16	17.88
	6,789	2,944	611	20.76
	11,374	12,056	2,098	17.36

.ct of 1916. ² Act of 1922. ³ At 190° C. instead of 200° C.

UTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT LOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
derived, or manufactured in whole or in of the products provided for in Group I cluding natural indigo and their deriva- tural—				
	6,899	$12,216	$3,665	30.00
	108,711	156,816	47,645	30.00
	6,684	8,612	2,584	30.00
	58,563	41,381	12,414	30.00
	59,306	81,816	24,545	30.00
	26,399	63,304	18,991	30.00
	1,547	3,094	1,965	63.50
	9,283	18,600	11,810	63.49
ithetic—				
	19,180	55,179	16,554	30.00
	73,232	24,072	7,222	30.00
	136,283	49,707	14,912	30.00
	21,614	22,190	666	30.00
	1,836	3,699	2,348	63.47

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar y*
1917 to 1923—Continued

GROUP III (DUTIABLE AT 20 PER CENT AD VALOREM; DUTIABLE AT 60 PER CE
AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Contin

Article and year	Pounds	Value	Duty	Act and p valu ri
When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo, and their derivatives—Continued				
Dyes obtained, derived, or manufactured from alizarin—				
1917	34	$75	$33	
1918	6,446	13,390	4,020	
1919	1,920	3,864	1,159	
1920	29,426	25,498	7,647	
1921	246,837	356,658	106,997	
1922 [1]	293,005	468,134	140,440	
Colors, dyes, stains, etc., obtained, derived, or manufactured from alizarin—				
1922 [2]	56,294	82,981	53,720	
1923	274,709	379,673	267,040	
Dyes obtained, derived, or manufactured from anthracene and carbasole—				
1917	28,146	11,326	3,398	
1918	12,827	20,087	6,026	
1919	7,162	7,772	2,332	
1920	216,508	208,754	62,626	
1921	226,956	422,941	126,883	
1922 [1]	330,129	605,187	181,556	
Colors, dyes, obtained, derived, or manufactured from anthracene or carbazol—				
1922 [2]	17,697	26,002	16,840	
1923	7,319	8,126	5,388	
ndigoids, whether or not obtained from indigo—				
1917	129,983	140,982	42,280	
1918	3,376	13,744	4,123	
1919	34,049	82,779	24,834	
1920	86,439	196,783	59,035	
1921	76,123	72,154	21,646	
1922 [1]	184,886	267,059	80,118	
1923				
Indigo, natural—				
1917	2,261,122	4,230,510	1,269,153	
1918	1,637,914	2,007,958	602,387	
1919	234,991	285,925	85,778	
1920	36,537	69,528	20,856	
1921	77,121	154,538	46,361	
1922 [1]	14,461	19,074	5,722	
1922 [2]				
1923	9,102	4,149	3,427	
Indigo, synthetic—				
1917	1,379,349	871,267	261,380	
1918	690,414	342,589	102,777	
1919	537,697	327,133	98,140	
1920	171,101	207,299	62,190	
1921	70,975	84,901	25,470	
1922 [1]	86,585	123,702	37,111	
1922 [2]				
1923	356	117	95	
Colors, dyes, stains, etc., derived from indigo—				
1922 [2]	872	1,482	950	
1923	13,864	18,636	12,152	
Colors, or color lakes obtained, derived, or manufactured from alizarin—				
1917	7,062	18,680	5,957	
1918	1,499	4,490	1,428	
1919	15,358	14,405	5,089	
1920	98,735	172,841	56,789	
1921	59,290	66,171	22,816	
1922 [1]	79,542	62,986	27,077	
1922 [2]				
1923 (see, "Dyes, etc., from alizarin").				

[1] Act of 1916. [2] Act of 1922.

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*—Continued

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives—Continued				
Colors, or color lakes obtained, derived, or manufactured from anthracene and carbazols—				
1917	53,205	$49,729	$17,579	35.35
1918	27,900	22,546	8,159	36.19
1919	38,073	55,475	18,546	33.43
1920	260,060	529,966	171,993	32.45
1921	62,748	65,635	22,828	34.78
1922 [1]	27,535	63,102	20,032	31.75
1922 [2]				
1923 (see, "Dyes, etc., from anthracene and carbazole")				
All other color, dyes, or stains, whether soluble or not in water, color acids, color bases, or color lakes—				
1917	2,257,476	2,574,363	885,183	34.38
1918 [3]	1,799,467	2,161,799	738,513	34.16
1919	1,991,687	2,848,294	954,073	33.50
1920	2,807,807	4,093,389	1,368,407	33.43
1921	2,751,535	3,968,319	1,328,072	33.47
1922 [1]	2,077,712	2,941,773	965,640	32.83
1922 [2]	677,849	894,844	584,356	65.30
1923	3,059,361	4,154,091	2,706,610	65.16
Phenolic resin, synthetic—				
1917	134,702	11,596	10,214	88.08
1918				
1919	1,114	2,860	914	31.95
1920	2,479	2,681	928	34.63
1921	1,420	2,366	781	33.00
1922 [1]	762	1,404	452	32.17
1923				
Resinlike products prepared from articles provided for in pars. 27 and 1549:				
1922 [2]	1,756	2,094	1,379	65.87
1923	3,183	10,512	6,530	62.12
Photographic chemicals—				
1917	12,632	101,406	31,053	30.62
1918	14,550	108,537	33,289	30.67
1919	12,059	77,876	23,966	30.77
1920	21,808	67,640	21,382	31.61
1921	29,281	65,906	21,236	32.22
1922 [1]	3,287	4,465	1,471	32.94
1922 [2]	8,183	8,208	5,498	66.98
1923	10,182	28,504	17,815	62.50
Coal tar medicinals:				
Acetanilid—				
1917	15	22	6	25.00
1918				
1919	124	50	13	25.00
1920				
1921				
1922				
1923	58	82	53	64.95
Acetphenetidin—				
1917	3,280	40,352	10,088	25.00
1918				
1919				
1920				
1921				
1922				
1923	25	238	145	60.74
Acetylsalicylic acid—				
1917	1,474	4,670	1,168	25.00
1918				
1919	26	76	19	25.00
1920				
1921				
1922				
1923	1	7	4	61.00

[1] Act of 1916.
[2] Act of 1922.
[3] Does not include 110 pounds, valued at $322, duty $81.08, from Cuba.

TABLE 66.—*Imports of coal-tar products entered for consumption, calendar years 1917 to 1923*—Continued

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Coal tar medicinals—Continued				
Antipyrene—				
1917	21,842	$62,411	$15,603	25.00
1918	9,416	106,643	26,661	25.00
1919	13,736	135,565	33,891	25.00
1920	14,737	53,293	13,323	25.00
1921				
1922 [1]	12,604	18,468	4,617	25.00
1922 [2]	913	1,740	1,108	63.68
1923	14,250	20,602	13,339	64.75
Arsphenamine (salvarsan) and neo-arsphenamine—				
1923	5	211	127	60.17
Benzaldehyde—				
1922	571	914	588	64.38
1923	2,780	4,039	2,630	64.82
Novocain or procaine—				
1923	5	210	126	60.17
Phenolphthalein (25 per cent)—				
1917				
1918	100	1,200	300	25.00
1919				
1920	200	726	181	25.00
1921	5,055	2,385	596	25.00
1922 [1]	64	36	9	25.00
1922 [2]	1,487	8,877	5,430	61.17
1923	2,931	10,891	6,740	61.88
Salicylic acid and its salts, medicinal—				
1923	40	81	51	63.46
Medicinals—				
1917		284,346	85,304	30.00
1918		301,074	90,322	30.00
1919		168,466	50,540	30.00
1920		165,055	49,517	30.00
1921		280,299	84,090	30.00
1922 [1]		154,620	46,386	30.00
1922 [2, 3]	7,937	24,410	15,202	62.27
1923	43,325	164,238	101,576	61.85
Flavors—				
1917	35	408	122	30.00
1918	160	816	245	30.00
1919				
1920	14	27	8	30.00
1921				
1922				
1923	31	90	56	62.41
Saccharin—				
1917	554	6,544	360	5.50
1918				
1919				
1920	40	39	26	66.67
1921	46	103	30	29.03
1922 [1]	1	15	1	4.33
1922 [2]	1	14	8	60.30
Explosives: Picric acid—				
1923	1,980	3,929	2,496	63.53
Ink powder—				
1923	261	308	203	65.93
Synthetic tanning material—				
1923	1,412	2,162	1,396	64.57

[1] Act of 1916. [2] Act of 1922. [3] Other coal-tar medicinals.

TABLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*

DEAD OR CREOSOTE OIL (FREE)

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Gallons		*Gallons*		*Gallons*		*Gallons*	
England			8,984,045	$1,085,617	12,514,150	$2,568,285	19,455,981	$3,114,867
Scotland	1,125	$862	60,756	10,462	147,377	21,096	819	199
Canada	1,543,660	161,693	2,273,578	278,138	1,619,903	227,624	374,845	64,713
All other countries	462	314			[1] 4,145,722	979,444	13,397,787	1,576,849
Total	1,545,247	162,869	11,268,379	1,374,217	18,427,152	3,796,309	33,229,432	4,756,618

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Gallons		*Gallons*	
United Kingdom	22,383,535	$2,235,686		
Netherlands	14,471,820	1,528,941		
Germany	2,406,364	193,804		
Belgium	1,537,376	184,485		
Canada	768,442	97,533		
All other countries				
Total	41,567,537	4,240,449	64,199,636	$10,071,393

BENZOL OR BENZENE

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
Canada	1,315,696	$33,303	217,865	$5,617	486,619	$10,868	1,562,951	$39,020
All other countries							159,134	3,350
Total	1,315,696	33,303	217,865	5,617	486,619	10,868	1,722,085	42,370

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Canada	172,108	$1,167		
Germany	120	56		
All other countries				
Total	172,528	1,223	701,901	$21,937

[1] All from the Netherlands, except 6 gallons from Japan.

BLE —*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

CRESOL [1]

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
England	3,051,833	$256,917	4,935,748	$408,407	6,037,223	$509,710	1,708,992	$139,737
Scotland	1,676,354	196,116	1,516,610	149,373	4,198,397	382,637	934,842	96,260
Canada			800	1,028	16,400	1,360	4,600	881
Germany					66,050	7,674	705,448	57,289
Total	4,728,187	453,033	6,453,158	558,808	10,318,070	901,381	3,353,882	293,987

[1] No imports in 1922 and 1923.

NAPHTHALENE

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
United Kingdom	424,147	$13,253	1,342,091	$47,076	10,155,579	$357,954	2,644,997	$83,355
Belgium					413,274	16,972	96,928	5,412
Canada	1,328,496	44,540	1,836,478	43,795	2,959,976	78,704	1,708,868	44,341
Germany					381,740	34,135	42,683	2,265
Japan			612	42	98,695	7,653	2,320	227
Italy					494,644	17,077		
Australia			60,075	1,352	168,923	3,528		
All other countries					339,340	14,198		
Total	1,752,643	57,793	3,239,256	92,265	15,012,171	530,221	4,495,796	135,941

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
United Kingdom	2,488,716	$38,619		
Canada	532,935	12,823		
Netherlands	110,365	2,047		
Germany	11,316	446		
Japan	1,000	94		
Total	3,144,332	54,029	21,036,458	$378,365

TAR AND PITCH OF COAL

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Barrels		*Barrels*		*Barrels*		*Barrels*	
England	51	$686	600	$2,725	1,127	$4,166	7	$92
Scotland			100	256	580	3,706		
Canada	26,499	49,069	25,003	44,093	18,824	41,940	21,948	47,913
All other countries					150	350	13	35
Total	26,550	49,755	25,703	[1]47,074	20,681	50,162	21,968	48,040

TABLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

TAR AND PITCH OF COAL—Continued

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Barrels		*Barrels*	
England	162	$1,241		
Scotland	100	956		
Canada	24,563	56,229		
All other countries	28	91		
Total	24,853	58,517	14,775	$46,825

TOLUOL OR TOLUENE

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
Canada			1,195,706	$30,768				
Total			1,195,706	30,768				

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Canada	143,900	$6,044		
Sweden	337	17		
Total	144,237	6,061	194,660	$7,928

ALL OTHER CRUDES: VALUE

Imported from—	1918	1819	1820	1821	1922	1923
France	$823	$54	$10,903	$1,507	$308,895	
England	57,264	42,875	178,866	19,015	54,943	
Scotland	825	870	1,581		1,570	
Canada	104,765	1,891	876	840	8,199	
Germany			9,179	352	6,373	
Netherlands					142	
All other countries			2,886	4		
Total	163,777	45,690	204,381	21,718	380,122	$807,641

CARBOLIC ACID

Imported from—	1918				1919			
	Carbolic acid, free		Carbolic acid, dutiable (phenol)		Carbolic acid, free		Carbolic acid, dutiable (phenol)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
England	155,236	$17,260	208,037	$54,884	1,619,823	$158,820	2,061	$264
Canada			75,300	7,613				
Scotland					345,466	28,968		
Total	155,236	17,260	283,337	62,497	1,965,289	187,788	2,061	264

TABLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

CARBOLIC ACID—Continued

Imported from—	1920				1921			
	Carbolic acid, free		Carbolic acid, dutiable (phenol)		Carbolic acid, free		Carbolic acid, dutiable (phenol)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
England	178,652	$18,258	1,040	$244	205,113	$21,841	250	[illegible]
Scotland	14,040	1,590						
Canada					9,072	1,008		
Total	192,692	19,848	1,040	244	214,185	22,849	250	[illegible]

Imported from—	1922 [1]		1923 [1]	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
England	610,789	$87,325		
Netherlands	62,715	12,258		
Germany	11,098	898		
All other countries	1,702	1,801		
Total	686,304	102,282	61,561	$14,[illegible]

[1] Dutiable

ALL OTHER ACIDS

Imported from—	1918		1919		1920		1921		1922		1923	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Lbs.		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*	
England	125	$1,114	63	$374	250	$1,087			60,471	5,228		
Japan	5	2							5	3		
France					11,199	8,182						
Germany					309	500	11,263	$3,012	4,445	2,394		
All other countries									8,938	9,936		
Total	130	1,116	63	374	11,758	9,769	11,263	3,012	73,859	17,561	18,944	$[illegible]

ANILINE OIL

Imported from—	1918		1919		1920		1921		1922		1923	
France					*Lbs.* 220	$72						

ANILINE SALTS

Imported from—	1918		1919		1920		1921		1922		1923	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Lbs.		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*	
England	21,273	$3,250					18,301	$12,029				
Germany					4	$1	15	80				
Total	21,273	3,250			4	1	18,316	12,109				

TABLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

ALL OTHER INTERMEDIATES

Imported from—	1918	1919	1920	1921
Belgium			$41,291	$18,774
France		$26,611	140,095	62,028
Germany			191,732	80,306
Italy			17,491	740
England	$15	48,722	302,235	98,502
Straits Settlements			41,237	
Japan	4,348	82	68,323	15
Canada		20,788		40,587
All other countries			29,264	40,650
Total	4,363	96,203	831,668	341,602

Imported from—	1922		1923	
Belgium				
France	45,666	31,180		
Germany	514,437	83,397		
Netherlands	83,998	18,898		
England	669,475	124,632		
Switzerland	62,261	43,856		
Japan	400	39		
Canada	329	308		
All other countries				
Total	1,376,566	302,310	2,598,281	513,692

ALIZARIN AND DERIVATIVES

Imported from—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
Germany					141,213	$197,562	265,007	$393,374
Switzerland	440	$572	220	$2,517	222,417	81,393	110	374
United Kingdom	4,310	3,739	23,417	21,084	25,196	18,898	44,026	54,869
Canada	1	2	215	414	297	1,806	2	5
Japan	15,141	58,948						
Belgium					46,283	32,857	13,280	9,964
Netherlands					5,906	10,314	12,483	21,562
All other countries	500	7,629	23	265	444	669	20,204	29,870
Total	20,392	70,890	23,875	24,280	441,756	343,519	375,112	510,038

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Belgium	1,232	$2,359		
Denmark	1,560	2,240		
France	7,379	10,137		
Germany	323,239	498,548		
Italy	46,340	57,686		
Netherlands	47,791	61,043		
Switzerland	28,672	41,670		
United Kingdom	22,758	28,002		
Canada	887	249		
All other countries				
Total	479,858	701,934	290,130	$403,612

TABLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

ANTHRACENE AND CARBAZOLE COLORS AND DYES

Imported from—	1922 [1]		1923	
	Pounds	Value	Pounds	Value
Germany	11,000	$23,128		
England	6,797	2,874		
Total	17,697	26,002	8,319	

COLOR LAKES

France	16	23		
Germany	223	239		
Total	239	262	4,263	

[1] Beginning Sept. 22, 1922.

INDIGO

Imported from—	1918				1919			
	Indigo, natural (dutiable)		Indigo, synthetic (dutiable)		Indigo, natural (dutiable)		Indigo, synthetic (dutiable)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
Switzerland	25,762	$38,719	770,212	$410,421	15,796	$29,857	726,440	
England	264,975	463,510	6,817	5,587	10,584	16,647	1,468	
British India	1,138,176	1,284,434			99,597	99,901		
Salvador	234,452	299,554			60,940	67,262	8,400	
All other countries	83,709	108,150			40,557	46,448	87,570	
Total	1,747,074	2,194,367	777,029	416,008	227,474	260,115	823,878	

Imported from—	1920				1921				1922			
	Indigo, natural (dutiable)		Indigo, synthetic (dutiable)		Indigo, natural (dutiable)		Indigo, synthetic (dutiable)		Indigo, natural (dutiable)		Indigo, synthetic (dutiable)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Lbs.		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*	
Switzerland	57,411	$150,957	285,153	$252,708	27,366	$55,142	59,873	$101,073	6,501	$9,482	63,355	$84,53
England	27,269	51,556	1,229	361	9,245	9,857	6,895	5,045	4,413	2,904	2,000	
Salvador	10,214	20,286			13,158	11,112						
France	50,066	70,008	400,589	172,692			331,320	87,407			5,324	
Germany	4,346	5,171	25,029	18,220	882	2,382	2,829	2,288	1,536	1,462	610	
India	2,850	7,392										
Italy			54,422	37,311			532	128			929	
All other countries	48	48			1,838	7,202	6,813	4,962				
Total	152,204	305,428	766,422	481,292	52,489	85,695	408,262	200,903	12,450	13,848	72,218	101,46

Imported from—	1923			
	Indigo, natural (dutiable)		Indigo, synthetic (dutiable)	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Total	10,473	$5,216	631	

BLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

INDIGO, DYES, COLORS, STAINS, ETC. (DUTIABLE) [1]

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
many	100	$752		
	772	730		
other countries				
Total	872	1,482	13,809	$18,174

Sept. 22 to Dec. 31.

COAL-TAR COLORS OR DYES (DUTIABLE)

Imported from—	1918, value	1919		1920		1921	
		Quantity	Value	Quantity	Value	Quantity	Value
		Pounds		*Pounds*		*Pounds*	
lgium		36,968	$63,119	190,414	$153,020	31,813	$56,481
nce	$76,506	11,746	20,853	70,821	100,884	62,468	90,328
many		143,031	83,563	1,155,501	1,565,300	1,050,028	1,718,776
itzerland	1,762,688	1,284,199	2,176,463	1,372,490	2,693,653	1,504,970	2,005,265
gland	561,609	609,703	664,548	345,889	394,668	287,377	358,463
other countries	68,546	165,750	160,730	351,758	351,277	169,699	216,035
Total	2,469,439	2,215,397	3,169,276	3,486,873	5,258,802	3,106,355	4,445,348

Imported from—	1922 [1]		1922 [2 3]	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
lgium	1,941	$849		
nce	36,163	16,038	15,111	$17,523
rmany	1,138,951	1,662,608	266,255	344,569
ly	49,657	51,584	48,248	64,608
therlands	48,266	75,911	73,244	149,538
itzerland	1,109,301	1,809,778	295,470	390,457
gland	165,683	139,577	31,374	27,812
other countries	3,614	6,496	8,657	12,417
Total	2,553,576	3,762,841	738,359	1,006,924

	1923	
	Quantity	Value
	Pounds	
rmany	1,580,403	$1,945,814
itzerland	857,466	1,331,075
ited Kingdom	108,410	111,969
other countries	706,103	1,035,453
Total	3,252,382	4,424,311

ALL OTHER COAL-TAR PRODUCTS

Imported from—	1918 [4]	1919	1920	1921	1922	1923
nce	$11,900					
therlands	50					
itzerland	3,045					
gland	47,548					
xico	32					
Total	62,575					

an. 1 to Sept. 21.
Title changed to: Colors, dyes, stains, color acids and color bases, n. e. s.
Sept. 22 to Dec. 31.
July 1 to Dec 31.

TABLE 67.—*General imports of coal-tar products, by countries, calendar years 1918–1923*—Continued

MEDICINAL PREPARATIONS (VALUE)

Imported from—	1918	1919	1920	1921	1922[1]	1923
France	$32,129	$58,749	$21,724	$45,378	$20,089	
Germany			59,133	126,862	74,983	
Italy		1,329	8	60	16,953	
Netherlands		12,257	21,203	11,680	25,462	
Spain		94	523	266	11	
Switzerland	154	1,761	18,571	30,151	35,473	
England	7,499	20,302	40,339	59,681	31,701	
Scotland		137	87			
Canada	53,324	77,162		1	16	
Peru	114					
Venezuela		69	7			
Japan	6,142	351	162	299	35	
All other countries	10		3,816	227	3,947	
Total	99,372	172,211	165,573	281,607	208,670	

[1] Sept. 22, to Dec. 31. Jan. 1 to Sept. 21, included in medicinal preparations (n. e. s.), a total value of $372,674.

EXPLOSIVES

	Quantity	Value
	Pounds	
Italy	5,470	
Total	5,470	

ALL OTHER FINISHED PRODUCTS

Imported from—	1918	1919	1920	1921
France	$4,162	$25,955	$37,192	
Germany			21,406	
Switzerland	2,901	1,447	6,715	
England	54,502	57,166	10,307	
Canada	816			
All other countries			29	
Total	62,381	84,568	75,649	

Imported from—	1922		1923	
	Quantity	Value	Quantity	Value
			Pounds	
France		$430		
Germany		16,658		
Switzerland		715		
England		2,157		
Canada		1		
All other countries				
Total		19,961	14,885	

TABLE 68.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1923.*

COAL TAR

Exported to—	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Barrels		*Barrels*		*Barrels*		*Barrels*	
Europe	2,069	$12,297	230	$900	243	$1,441	212	
North America	54,149	139,456	71,749	158,205	74,374	208,561	91,716	
South America	808	6,288	2,759	20,166	3,725	23,656	457	
Asia	198	1,505	475	3,174	10	65	17	
Oceania	154	1,739	45	301	81	995		
Africa	1,176	7,435	1,334	15,757	17	49	4	
Total	58,554	168,720	76,592	198,503	88,350	234,767	92,406	

TABLE 68.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1923*—Continued

COAL TAR—Continued

Exported to—	1922		1923	
	Quantity	Value	Quantity	Value
	Barrels		*Barrels*	
Europe	46	$392		
North America	101,396	209,631		
South America	580	3,142		
Asia	63	545		
Oceania	57	245		
Africa	8	100		
Total	102,150	214,055	513,834	$1,694,494

COAL-TAR DISTILLATES, n. e. s.

Benzol

	1918		1919		1920		1921	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
France	32,599,682	$1,854,216	12,319,900	$407,622	2,528,494	$138,850	24,344,624	$1,095,063
Chile					229,079	16,760		
England			113,300	10,197	57,500	4,970	46,073,896	1,797,780
Germany					669,494	36,902		
Canada	136,571	7,389	335,799	21,313	389,783	23,904	44,725	287
Belgium					3,150,240	238,617		
Argentina	75,442	7,329	973,978	60,563	353,522	23,907	549,896	37,571
Japan	136,480	8,680	280,442	18,590	67,200	6,720	900	81
Italy	299,659	22,704			4,961,878	357,956	348,880	22,030
All other countries	46,743	4,042	215,000	16,847	767,078	79,354	667,479	54,355
Total	33,294,577	1,904,360	14,238,419	535,132	13,174,268	927,940	72,030,400	3,007,086

	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
France	20,158,912	$738,078		
Spain	44,697	8,045		
England	39,649,410	1,390,924		
Ireland	448,728	27,400		
Canada	2,045,994	69,984		
Mexico	13,405	1,048		
Argentina	445,136	27,464		
Chile	156,251	9,521		
Java and Maderia	48,216	2,550		
Australia	86,350	7,067		
British South Africa	17,312	1,500		
Algeria and Tunis	1,529,483	68,935		
All other countries	96,508	10,305		
Total	64,740,402	2,362,821	111,336,768	$3,647,660

ALL OTHER COAL-TAR DISTILLATES (VALUE)

Exported to—	1918	1919	1920	1921
France	$2,188,439	$33,387	$445,520	$10,347
Belgium			474,793	
Italy	345,407	14,674	290,449	
England	927,295	127,583	1,632,599	28,498
Canada	1,477,984	105,335	314,641	156,917
Spain	96,798	64,917	615,284	26,334
Mexico	78,160	61,441	136,063	14,090
Brazil	72,162	101,305	193,089	32,550
Japan	475,377	250,061	1,158,196	79,746
Switzerland	46,831	8,144	1,632,599	44,833
All other countries	159,377	336,903	69,016	116,193
Total	5,867,830	1,103,750	6,962,249	509,508

TABLE 68.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1925*—Continued

ALL OTHER COAL-TAR DISTILLATES (VALUE)—Continued

Exported to—	1922[1]	1923[1]
France	$995	
Belgium	12,849	
Canada	51,718	
Norway	1,444	
Honduras	15,454	
Mexico	13,691	
Brazil	29,738	
Cuba	2,561	
Japan	3,644	
All other countries	22,889	
Total	154,983	$300,287

[1] Includes toluol and solvent naphtha.

CARBOLIC ACID

Exported to—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Canada	15,306	$1,143		
Mexico	50,096	4,040		
Cuba	7,009	694		
Japan	91,073	9,100		
Kwangtung (leased territory)	44,211	4,563		
All other countries	15,451	3,683		
Total	223,146	28,223	232,830	$34,389

ANILINE OILS AND SALTS

Spain	10,000	$1,450		
Canada	211,010	40,919		
Mexico	26,895	3,575		
British India	29,302	7,000		
Japan	30,600	6,120		
Philippines	17,597	2,993		
Australia	9,012	1,610		
All other countries	6,804	1,945		
Total	341,220	65,602	497,457	$95,023

NAPHTHALENE

Switzerland	6,000	$1,600		
Canada	17,542	297		
Mexico	11,558	1,044		
Cuba	21,127	1,204		
British India	11,853	770		
Japan	14,610	4,329		
Philippines	8,388	739		
All other countries	18,426	2,674		
Total	109,514	12,657	95,164	$10,394

NITROBENZOL[1]

Norway	26,880	$2,957		
Canada	5,682	683		
Cuba	3,203	399		
Dominican Republic	3,040	608		
Australia	2,147	312		
All other countries	2,028	337		
Total	42,980	5,296		

[1] Included in other intermediates for 1923.

:.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1923*—Continued

OTHER INTERMEDIATES

Exported to—	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Ponnds*	
	28,463	$7,280		
	65,438	13,834		
	5,054	1,500		
	172,186	33,695		
	77,642	3,481		
	10,199	1,636		
	42,618	8,275		
	12,192	1,823		
	314,774	65,047		
	54,888	12,910		
	20,050	11,844		
intries	31,630	6,277		
	835,134	167,602	1,218,183	$243,060

COLOR LAKES [1]

	16,900	$14,627		
	7,616	1,028		
	100	30		
	1,000	800		
	135	86		
	2,440	3,298		
intries				
	28,228	19,928		

or 1923 included in other colors, dyes, and stains.

DYES AND DYESTUFFS (VALUE)

ported to—	1918			1919		
	Aniline dyes	Logwood extracts	All other	Aniline dyes	Logwood extracts	All other
	$176,769	$10,541	$131,280	$70,296	$2,319	$36,063
				90	34,787	19,193
	6,345	263,610	496,875	127,059	596,042	229,689
				150	290	
	274,903	70,237	234,238	269,130	58,716	180,359
				26,284	21,735	9,104
			12,825	8,570		
	22,500	7,728	5,000	193	22,824	
dom	380,181	345,458	524,576	413,700	304,686	423,719
	836,445	82,292	724,522	1,015,334	119,871	1,007,892
	289,327	5,666	181,029	467,806	17,438	230,359
rica	5,617	400	5,498	5,941	892	14,544
	23,447	742	35,473	34,307	137	40,900
ca	1,719,408	128,645	931,600	1,651,872	66,099	585,127
	4,248,367	504,542	2,720,399	5,565,053	48,063	1,921,202
	100,490	20,194	133,493	177,964	14,041	143,223
	3,993	715	15,534	45,598	1,508	8,281
			1,055	5,334	9,671	2,438
	518,895	104,748	472,222	535,383	18,349	84,544
				22,694	8,584	15,706
		985	4,529	13,663	1,300	7,303
ntries	22,924	4,877	6,761	267,682	8,584	44,780
	8,629,611	1,551,380	6,636,099	10,724,071	1,355,936	5,004,428

TABLE 68.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1923*—Continued

DYES AND DYESTUFFS (VALUE)—Continued

Exported to—	1920			1921		
	Aniline dyes	Logwood extracts	All other	Aniline dyes	Logwood extracts	All other
Portugal	$66,752	$5,970	$20,688	$1,432		
Belgium	507,371	118,339	41,523	100,821	$6,843	$[illegible]
France	807,241	607,017	391,060	67,535	66,762	[illegible]
Germany	454	1,456	7,745	653	13,885	[illegible]
Italy	582,236	404,367	275,149	45,068	8,723	[illegible]
Netherlands	39,682	73,472	56,057	1,938	2,530	[illegible]
Russia (European)	100					
Switzerland	132,359	60,157	92,017	20,374		[illegible]
United Kingdom	1,318,498	729,026	1,079,871	165,711	21,096	[illegible]
Canada	1,547,109	183,061	982,665	584,664	71,331	[illegible]
Mexico	1,091,603	11,092	210,145	149,009	3,560	[illegible]
Central America	13,159	1,852	13,730	7,982	975	[illegible]
West Indies	52,745	18,144	97,922	1,585	91	[illegible]
South America	2,282,210	45,586	497,029	432,881	16,460	[illegible]
Asia	12,783,303	195,493	3,208,107	3,131,071	347,610	[illegible]
Oceania	277,660	41,283	134,196	207,473	13,190	[illegible]
Africa	65,077	1,248	28,251	61,699	486	[illegible]
Denmark	26,463	2,903	2,794	1,305		[illegible]
Spain	682,998	77,183	149,365	36,844	535	[illegible]
Sweden	67,921	1,250	29,802	2,786		[illegible]
Norway	4,568	1,110	15,998	1,800		[illegible]
All other countries	100,971	25,051	38,997	44,369	15,868	[illegible]
Total	22,450,480	2,605,060	7,373,111	5,067,000	589,736	[illegible]

OTHER COLORS, DYES, AND STAINS

Exported to—	1922		1923[1]	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Belgium	107,712	$76,342		
France	12,100	11,975		
Greece	16,830	8,434		
Italy	25,702	51,469		
Netherlands	16,915	2,792		
Portugal	24,973	10,787		
Spain	87,506	42,426		
United Kingdom	16,139	5,342		
Canada	1,861,255	1,108,518		
Mexico	159,857	87,920		
Cuba	39,344	27,335		
South America	425,551	323,922		
British India	733,425	311,504		
China	3,588,563	924,026		
Japan	959,409	844,458		
Philippine Islands	33,384	8,618		
Australia	58,665	31,265		
New Zealand	36,680	21,439		
British South Africa	28,542	31,976		
All other countries	71,397	30,069		
Total	8,324,209	3,981,217	17,924,536	[illegible]

MEDICINALS

Belgium	3,040	$450		
Greece	3,300	850		
Turkey in Europe	297,223	80,954		
England	80,340	31,709		
Canada	55,874	13,001		
Honduras	5,916	3,091		
Mexico	37,829	30,476		
Cuba	11,375	16,122		
Venezuela	3,148	1,796		
British India	3,330	3,107		
Australia	27,575	21,135		
British South Africa	4,848	3,853		
All other countries	20,168	17,992		
Total	554,166	224,546	237,975	[illegible]

[1] Includes color lakes.

TABLE 68.—*Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1918–1923*—Continued

SYNTHETIC PHENOLIC RESINS[1]

	1922		1923	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
England	500	$69		
Canada	121,183	7,786		
Mexico	250	43		
China	1,600	1,762		
Japan	4,620	3,523		
Total exports	128,153	13,183		

[1] Included in total "Other coal-tar finished products, n. e. s," for 1923.

PHOTOGRAPHIC CHEMICALS

England	11,274	$4,896		
Canada	65,411	15,971		
Mexico	15,019	7,228		
Cuba	16,738	6,306		
Argentina	24,526	9,124		
Japan	39,815	26,809		
Philippines	11,709	5,509		
Australia	10,806	9,018		
New Zealand	13,094	4,302		
All other countries	39,727	14,690		
Total	248,119	103,853	214,160	$96,317

OTHER COAL-TAR FINISHED PRODUCTS, N. E. S.

Denmark	37,226	$1,540		
France	80,800	2,560		
Norway	48,767	1,275		
England	264,009	33,285		
Canada	2,797,967	63,908		
Costa Rica	28,262	2,655		
Panama	67,434	2,079		
Mexico	470,344	26,902		
British West Indies	95,545	5,401		
Cuba	984,063	43,497		
Argentina	107,043	8,831		
Brazil	39,692	2,598		
Chile	78,574	4,664		
Colombia	80,661	13,442		
Peru	80,470	13,415		
Japan	67,948	17,550		
Australia	21,833	4,533		
All other countries	194,732	24,707		
Total	5,545,090	272,842	4,527,146	$480,749

TABLE 69.—*Imports and exports of inks, 1918–1923*

IMPORTS FOR CONSUMPTION

Calendar year	Ink and ink powders[1]		Printers' ink[2]			Writing and copying inks			All other, including ink powders		
	Quantity	Value	Rate of duty	Value	Duty collected	Rate of duty	Value	Duty collected	Rate of duty	Value	Duty collected
	Pounds		*Per cent*			*Per cent*			*Per cent*		
1918	------	------	15	$4,154	$623	15	$13,363	$2,004	15	$6,343	$951
1919	------	------	15	199	30	15	15,116	2,267	15	8,143	1,221
1920	------	------	15	15,228	2,284	15	15,505	2,326	15	10,687	1,603
1921	------	------	15	5,554	833	15	4,625	694	15	10,813	1,622
1922[3]	------	------	15	9,259	1,389	15	6,279	942	15	7,907	1,186
1922[4]	33,783	13,132	20	7,070	1,414	20	3,125	625	20	2,877	575
1923	101,993	23,730	20	5,613	1,123	20	4,979	996	20	13,265	2,653

DOMESTIC EXPORTS

Exported to—	Calendar year									
	1918		1919		1920		1921		1922	
	Printers' ink	All other inks	Printers' ink	All other inks	Printers' ink	All other inks	Printers' ink	All other inks	Printers' ink	All other inks
Europe	$48,394	$25,371	$210,482	$68,382	$224,129	$96,699	$101,914	$71,818	------	------
North America	256,507	206,360	320,008	297,959	366,784	328,889	321,389	200,361	------	------
South America	353,023	100,833	603,758	210,212	535,265	208,272	140,612	49,336	------	------
Asia	224,345	67,736	435,664	155,420	579,843	187,988	291,719	75,867	------	------
Oceania	116,424	42,452	113,288	109,962	171,640	105,984	108,453	45,017	------	------
Africa	42,189	5,429	29,726	14,282	15,091	8,887	6,743	6,700	------	------
Total	1,040,882	448,181	1,712,926	856,217	1,892,752	936,719	970,830	449,099	$993,352	$328,979

Exported to—	Calendar year					
	1922			1923		
	Writing ink	Printers' and lithographic ink	Other ink	Writing ink	Printers' and lithographic ink	Other ink
Europe	$30,722	$103,790	$17,447	------	------	------
North America	76,003	288,293	69,595	------	------	------
South America	25,023	193,371	7,556	------	------	------
Asia	62,790	255,151	20,191	------	------	------
Oceania	7,992	140,653	8,474	------	------	------
Africa	1,417	12,094	1,768	------	------	------
Total	203,947	993,352	125,031	$257,909	$1,273,813	$200,744

[1] General import figures.
[2] Beginning Sept. 22, 1922, heading changed to "Printers' and lithographic ink."
[3] Jan. 1 to Sept. 21.
[4] Sept. 22 to Dec. 31.

Directory of manufacturers of dyes and other synthetic organic chemicals, 1923

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
1	Abbott Laboratories	4753 Ravenswood Avenue, Chicago, Ill.
2	Acids Manufacturing Corporation	50 East Forty-Second Street, New York, N. Y. (Packer, Conn.)
3	Agawam Chemical Works (Inc.)	10 Weybosset Street, Providence, R. I. (North Attleboro, Mass.)
4	Althouse Chemical Co	500-540 Pear Street, Reading, Pa.
5	Alyco Manufacturing Co. (Inc.)	86-90 Orange Street, Bloomfield, N. J.
6	Amalgamated Dyestuff & Chemical Works (Inc.).	Plum Point Lane, Newark, N. J.
7	American Aniline Products (Inc.)	80 Fifth Avenue, New York, N. Y. (Lock Haven, Pa.)
8	American Tar Products Co. (Inc.)	208 South La Salle Street, Chicago, Ill. (Youngstown, Ohio; St. Louis, Mo.; Woodward, Ala.; Carrollville, Wis.; Follansbee, W. Va.; Chicago, Ill.)
9	Amido Products Co	126 Maiden Lane, New York, N. Y. (228 Emmet Street, Newark, N. J.)
10	Anderson Chemical Co	P. O. Box 307, Passaic, N. J. (266 Main Avenue, Wallington, N. J.)
11	Ansbacher & Co., A. B	527 Fifth Avenue, New York, N. Y. (Brooklyn, N. Y.)
12	Atlantic Dyestuff Co	Box 89, Portsmouth, N. H. (Newington, N. H.)
13	Atlantic Tar & Chemical Works (Ltd.)	P. O. Box 234, Bayway, Elizabeth, N. J.
14	Atlas Color Works	322 Ninth Street, Brooklyn, N. Y.
15	Baird & McGuire (Inc.)	Holbrook, Mass.
16	Barrett Co	40 Rector Street, New York, N. Y. (Plants distributed throughout United States.)
17	Bayer Co. (Inc.)	117 Hudson Street, New York, N. Y. (Rensselaer, N. Y.)
18	Beaver Chemical Corporation	Damascus, Va.
19	Beaver Manufacturing Co	Ballardvale, Mass.
20	Berghausen Chemical Co., E	915 Carr Street, Cincinnati, Ohio.
21	Berkheimer Manufacturing Co., J. E	2928 South M Street, Tacoma, Wash.
22	Brooklyn Color Works (Inc.)	Stewart Avenue and Cherry Street, Brooklyn, N. Y.
23	Brown Co	404 Commercial Street, Portland, Me. (Berlin, N. H.)
24	Bush Co. (Inc.), W. J	370 Seventh Avenue, New York, N. Y. (Linden, N. J.)
25	Butterworth-Judson Corporation	30 Church Street, New York, N. Y. (Newark, N. J.)
26	Cable Chemical Works	1700 Elston Avenue, Chicago, Ill. (Cable, Wis.)
27	Calco Chemical Co	Boundbrook, N. J.
28	California Ink Co	Station A, West Berkeley, Calif.
29	Carbide & Carbon Chemicals Corporation	30 East Forty-second Street, New York, N. Y. (Clendenin, W. Va.)
30	Carey Manufacturing Co., Philip	Lockland, Ohio.
31	Celluloid Co	36 Washington Place, New York, N. Y. (290 Ferry Street, Newark, N. J.)
32	Central Dyestuff & Chemical Co	Plum Point Lane, Newark, N. J.
33	Central Specialty Co	524 Delaware Street, Kansas City, Mo.
34	Certain-teed Products Corporation	100 East Forty-second Street, New York, N. Y. (East St. Louis, Ill.)
35	Chatfield Manufacturing Co., The	Seventy-fourth and Lebanon Streets, Cincinnati, Ohio.
36	Chemical Company of America (Inc.), The	46 Murray Street, New York, N. Y. (Springfield, N. J.).
37	Childs & Co. (Inc.), Charles M	43 Summit Street, Brooklyn, N. Y.
38	Chiris & Co., Antoine	147-153 Waverly Place, New York, N. Y. (Delawanna, N. J.)
39	Cincinnati Chemical Works (Inc.)	Evanston Station, Box 20, Cincinnati, Ohio. (Norwood and St. Bernard, Ohio.)
40	Citizens Gas Co	Majestic Building, Indianapolis, Ind.
41	Coleman & Bell Co., The	Norwood, Ohio.

Directory of manufacturers of dyes and other synth

No.	Name of company	Office
42	Combustion Utilities Corporation	8-10 I Ohi
43	Commercial Solvents Corporation	17 Ea (Te
44	Commonwealth Chemical Corporation	25 W (Ne
45	Commonwealth Color & Chemical Co	Nevin N.
46	Consolidated Color & Chemical Co	122 H N.
47	Cooks Falls Dye Works (Inc.)	68 Wi Fall
48	Cooper & Co. (Inc.), Charles	Van I
49	Coopers Creek Chemical Co	West
50	Corona Chemical Division (Pittsburgh Plate Glass Co.).	213-21
51	Crescent Color & Chemical Works	Fifty- Yor
52	Croton Color & Chemical Co. (Inc.)	293 B Huc
53	Crown Tar Works	900 Fl
54	Crystal Chemical Co	3414 N
55	David Chemical Co., Albert	44 W Hei
56	Debrook Co. (Inc.)	1105 N
57	Dehls & Stein	237 So
58	Delta Chemical & Iron Co	Wells,
59	Devoe & Reynolds Co. (Inc.)	101 Fu N.
60	Diarsenol Laboratories (Inc.)	454 El
61	Dovan Chemical Corporation	30 Ch side
62	Dow Chemical Co	Midla
63	duPont de Nemours & Co., E. I	Wilmi N. J
64	Dye Products & Chemical Co	200 F Van
65	Dyes & Chemicals of New Jersey (Inc.)	702 Ce
66	Dyestuffs & Chemicals (Inc.)	11th a
67	Eakins (Inc.), J. S. & W. R	24 Wa
68	Eastman Kodak Co	343 St
69	Essential Oil Co	Mulbe N. J
70	Essex Aniline Works (Inc	88 Bro Mas
71	Federal Color Laboratories (Inc	Norw
72	Finch Chemical Co., L. S	R. F. Ver
73	Fine Colors Co., Inc	2139 N
74	Fletcher Chemical Co	South
75	Flexasynth Laboratories, In	Olm-t N. Y
76	Foster-Heaton Co	273 B
77	Franken Color Works, A	116 W Y
78	Frey Bros	92 Rea N. J
79	Fries & Fries Co	150 W
80	Garfield Aniline Works	Mello
81	Gary Chemical Co	749 Br
82	Gaskell Chemical Corporation	157 Sp
83	Gebauer Chemical Co	619 Ba
84	General Synthesis Co	53 Ca
85	Goodrich Co., The B. F.	Akron
86	Grahame Chemical Co	P. O.
87	Granton Chemical Co	350 M Brun
88	Grasselli Chemical Co	Cleve N. J
89	Harmer Laboratories Co	2 Sout Lan
90	Harmon Color Works, Inc	91-47
91	Heller & Merz Co	408 W
92	Herrmann Co., Max	200 Fi Pros
93	Heyden Co. of America, Inc	80 Fif N. J
94	Hind & Harmer Pty. Co., The	Clark
95	Hooker Electrochemical Co	25 Pin N. Y
96	Horl Color Products Co., The	1636 C
97	Huggins & Son, James	239 Me

Directory of manufacturers of dyes and other synthetic organic chemicals, 1923—Con.

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
98	Hydrocarbon Chemical Co	951 East Orange Street, Lancaster, Pa.
99	Hynson, Westcott & Dunning	Charles and Chase Streets, Baltimore, Md.
100	Imperial Color Works (Inc.)	Glens Falls, N. Y.
101	Independent Coal Tar Co	88 Broad Street, Boston, Mass. (Taunton, Mass.)
102	Interstate Chemical Co	667 Garfield Avenue, Jersey City, N. J.
103	Ising Corporation, The C. E	Flushing, N. Y.
104	Kent Color Corporation	2 South Ninth Street, Brooklyn, N. Y.
105	Kentucky Color & Chemical Co	Thirty-fourth Street south of Bank Street. (Louisville, Ky.)
106	Kerin Manufacturing Co., The	Central National Bank, Marietta, Ohio.
107	Klipstein & Sons Co., E. C	644 Greenwich Street, New York, N. Y. (Carteret, N. J.; South Charleston, W. Va.)
108	Kober Chemical Co	Nepera Park, N. Y.
109	Kohnstann & Co. (Inc.), H	87 Park Place, New York, N. Y. (Brooklyn, N. Y.)
110	Lakeview Laboratories	2 Jersey Street, Buffalo, N. Y.
111	LaMotte Chemical Products Co	13 West Saratoga Street, Baltimore, Md.
112	Lasher & Co. (Inc.), F. G	Maspeth and Gardner Avenues, Brooklyn, N. Y.
113	Lee Co., A	Lawrence, Mass. (Methuen, Mass.)
114	Lewis Mfg. Co., F. J	2513 South Robey Street, Chicago, Ill.
115	Lucas Paint Co., Alston	1031 Currier Street, Chicago, Ill.
116	Lucas & Co. (Inc.), John	322 Race Street, Philadelphia, Pa. (Gibbsboro, Camden County, Pa.)
117	Maas & Waldstein Co	45 John Street, New York, N. Y. (Newark, N. J.)
118	Mallinckrodt Chemical Works	3600 North Second Street, St. Louis, Mo.
119	Marx Color & Chemical Co., Max	192 Colt Street, Irvington, N. J.
120	Massachusetts Department of Public Health	Room 540, State House, Boston, Mass.
121	May Chemical Works	204 Niagara Street, Newark, N. J.
122	Maywood Chemical Works	Maywood, N. J.
123	Mepham & Co., George S	Twentieth and Lynch Avenues, E. St. Louis, Ill.
124	Merck & Co	45 Park Place, New York, N. Y. (Rahway, N. J.)
125	Merrimac Chemical Co	148 State Street, Boston, Mass. (Woburn, Mass.)
126	Metz Laboratories (Inc.), H. A	122 Hudson Street, New York, N. Y. (Brooklyn, N. Y.)
127	Miner-Edgar Co., The	110 William Street, New York, N. Y. (Newark, N. J.)
128	Monsanto Chemical Works	1724 South Second Street, St. Louis, Mo.
129	Morana (Inc.)	118 East Twenty-seventh Street, New York, N. Y. (Elizabeth, N. J.)
130	National Ammonia Co. of Pennsylvania	Delaware Avenue and Kirk Street, Philadelphia, Pa.
131	National Aniline & Chemical Co. (Inc.)	40 Rector Street, New York, N. Y. (Buffalo, N. Y.; Marcus Hook, Pa.)
132	Naugatuck Chemical Co	Naugatuck, Conn.
133	New England Aniline Works (Inc.)	95 Broad Street, Boston, Mass. (Ashland, Mass.)
134	New Haven Gas Light Co	80 Crown Street, New Haven, Conn.
135	New York Color & Chemical Co	Belleville, N. J. (Belleville, N. J.; Philadelphia, Pa.)
136	New York Quinine & Chemical Works (Inc.)	152-154 William Street, New York, N. Y. (Brooklyn, N. Y.)
137	Newport Company, The	P. O. Box, 1582, Milwaukee, Wis. (Carrollville, Wis.; Passaic, N. J.)
138	Niagara Alkali Co	Buffalo Avenue, Niagara Falls, N. Y.
139	Niagara Smelting Corporation	Bridge Station, Niagara Falls, N. Y.
140	Noil Chemical & Color Works (Inc.)	152 West One hundred and eighth Street, New York, N. Y.
141	Northwestern Chemical Co	137 Sixth Avenue, Wauwatosa, Wis.
142	Norvell Chemical Corporation	99 John Street, New York, N. Y. (Perth Amboy, N. J.)
143	Oldbury Electrochemical Co	Niagara Falls, N. Y.
144	Organo-Chemico Co	Columbus Avenue, Sandusky, Ohio.
145	Palatine Aniline & Chemical Corporation	81 North Water Street, Poughkeepsie, N. Y.
146	Passaic Color Corporation	50-60 Eighth Street, Passaic, N. J.
147	Peerless Color Co	521-535 North Avenue, Plainfield, N. J.
148	Pennsylvania Coal Products Co	Reiber Building, Butler, Pa.
149	Perth Amboy Chemical Works	709-717 Sixth Avenue, New York, N. Y. (Perth Amboy, N. J.)
150	Pfizer & Co., Charles	81 Malden Lane, New York, N. Y.
151	Pharma Chemical Corporation	233 Broadway, New York, N. Y. (Bayonne, N. J.)
152	Portland Gas & Coke Co	Gasco Building, Portland, Oreg.
153	Powers-Weightman-Rosengarten Co	916 Parrish Street, Philadelphia, Pa.
154	Providence Chemical Laboratories	51 Empire Street, Providence, R. I.
155	Puritan Dye & Chemical Co	Northborough, Mass.
156	Quaker Oats Co	80 East Jackson Street, Chicago, Ill. (Cedar Rapids, Iowa.)
157	Radiant Dye & Color Works	2837 West Twenty-first Street, Brooklyn, N. Y.
158	Republic Creosoting Co	1614 Merchants Bank Building, Indianapolis, Ind. (Norfolk, Va.; Seattle, Wash.; St. Louis Park, Minn.; Mobile, Ala.; Indianapolis, Ind.)

Directory of manufacturers of dyes and other synthetic

No.	Name of company	Office ad th
159	Rhodia Chemical Co	89 Fult Brunsv
160	Roessler & Hasslacher Chemical Co	709-717 S ara Fa
161	Rossville Co., The	Lawrenc
162	Ruxton (Inc.), Philip	220 West (Brook
163	Sanborn Chemical Works	Putnam,
164	Selden Co	339 Secon
165	Sepoy Color & Chemical Co	371 Durh
166	Seydel Chemical Co	86 Forre W. Va
167	Sherwin-Williams Co	601 Cana Ill.)
168	Siegle Corporation of America, G	Chestnut Staten
169	Siemon & Elting (Inc.)	93 Nassa N. J.)
170	Sinclair & Valentine Co	11 St. Cl
171	Southern Dyestuffs Co	Nitro, W
172	Special Chemicals Co	Highlan
173	Springdale Finishing Co. (Inc.)	Pine Str
174	Squibb & Sons, E. R	80 Beekr lyn, N
175	Stearns & Co., Frederick	6533 Eas
176	Sterling Chemical Works (Inc.)	344 Thon
177	Sun Chemical & Color Co	309 Suss
178	Synfleur Scientific Laboratories (Inc.)	Monticel
179	Synthetical Laboratories of Chicago	1326 W.
180	T. M. & G. Chemical Co	Elizabet
181	Tar Products Corporation	1404 Tu (East
182	Terpene Chemical Co	409 W. V
183	Texdel Chemical Co	120 Mai City a
184	Textile Chemical Co. (Inc.)	Public S R. I.
185	Thatcher Process Co. (Inc.)	523 Trac
186	Todd Co., A. M	North R
187	Trico Chemical Co	502 Iron
188	Uhlich & Co. (Inc.), Paul	11 Cliff N. Y.
189	Ullman Co., Sigmund	Park Av Street,
190	Ultro Chemical Corporation	41 Union N. Y.)
191	U. S. Industrial Chemical Co	110 East (Balti
192	Van Dyk & Co	4-6 Platt N. J.)
193	Van Schaack Bros. Chemical Works	3358 Ave
194	Vernon Synthetic Chemical Corp. (Inc.)	166 Vern
195	Verona Chemical Co	29 Veron
196	Victor Chemical Works	343 Sout cago H
197	Wamesit Chemical Co	Lowell,
198	Warner-Jenkinson Co	2526 Bal
199	Western Dry Color Co	Fifty-sec
200	Westvaco Chlorine Products (Inc.)	52 Vand Charle
201	White Tar Company of N. J. (Inc.), The	56 Vesey N. J.,
202	White Chemical Co., Wilbur	Owego,
203	Wilhelm Co., The A	Third an
204	Williamsburg Chemical Co. (Inc.)	240 Morg
205	Wolff-Alport Chemical Corporation	593 Irvin
206	Wyoming Dyestuff & Chemical Corp	1 Carbon
207	Yocum Laboratories (Inc.)	168 Cott
208	Zinsser & Co	Hastings

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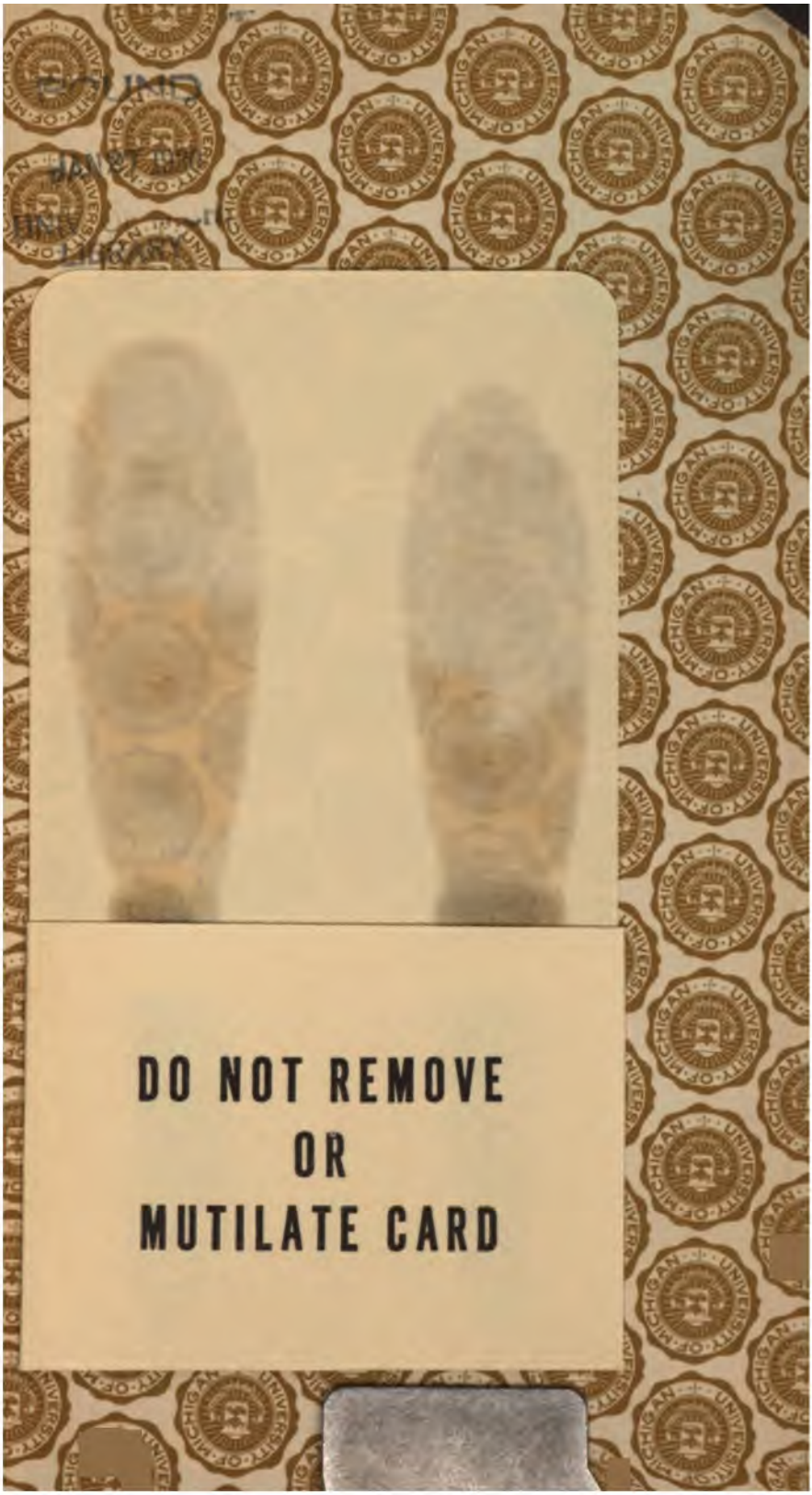
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